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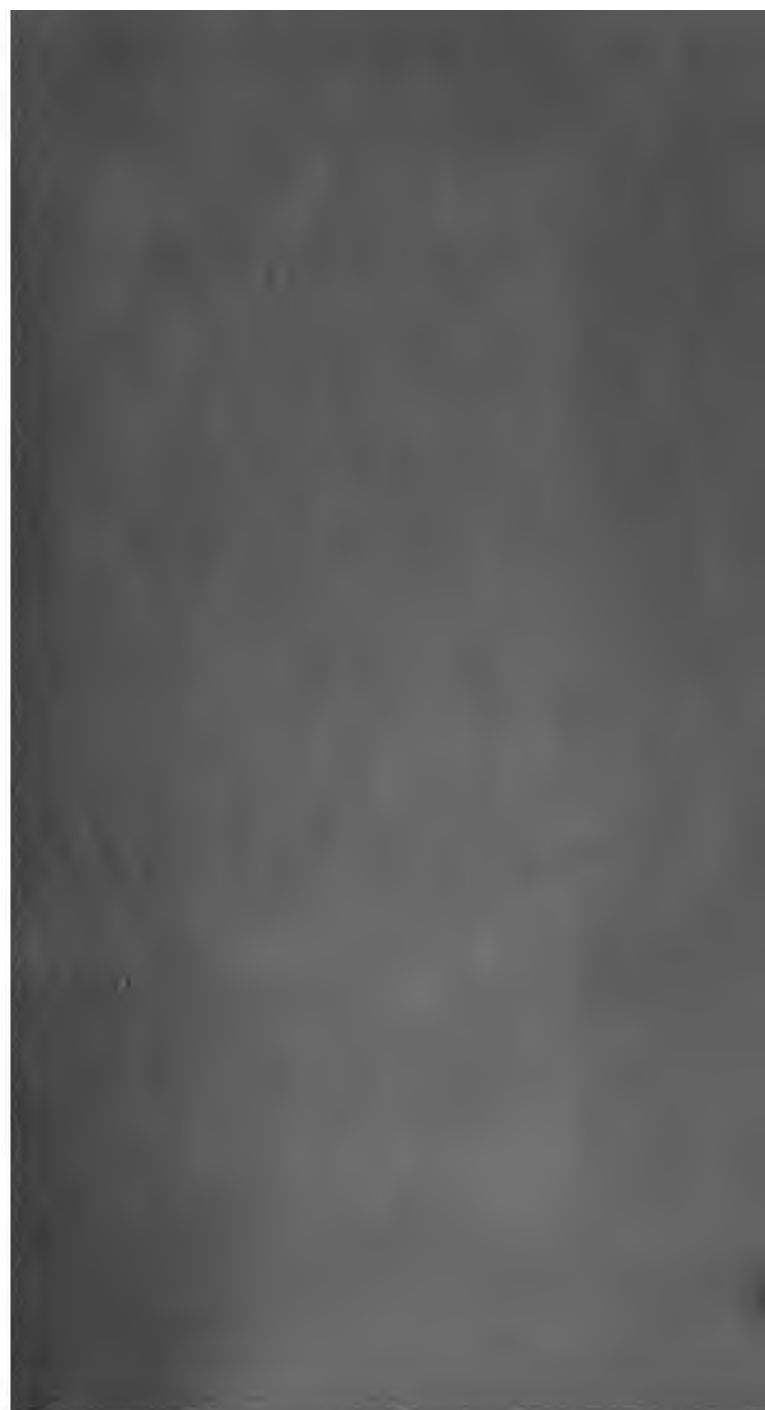
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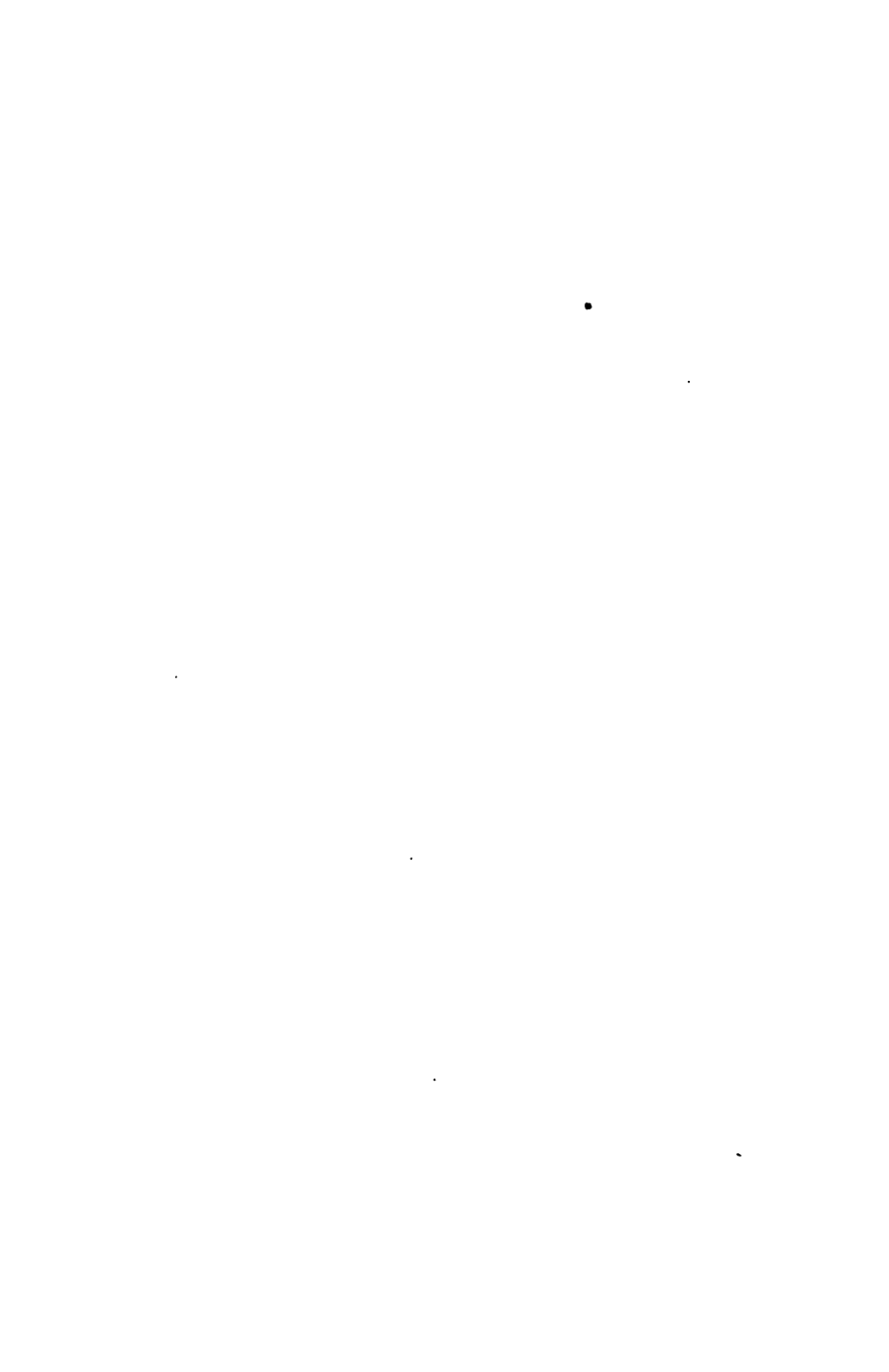
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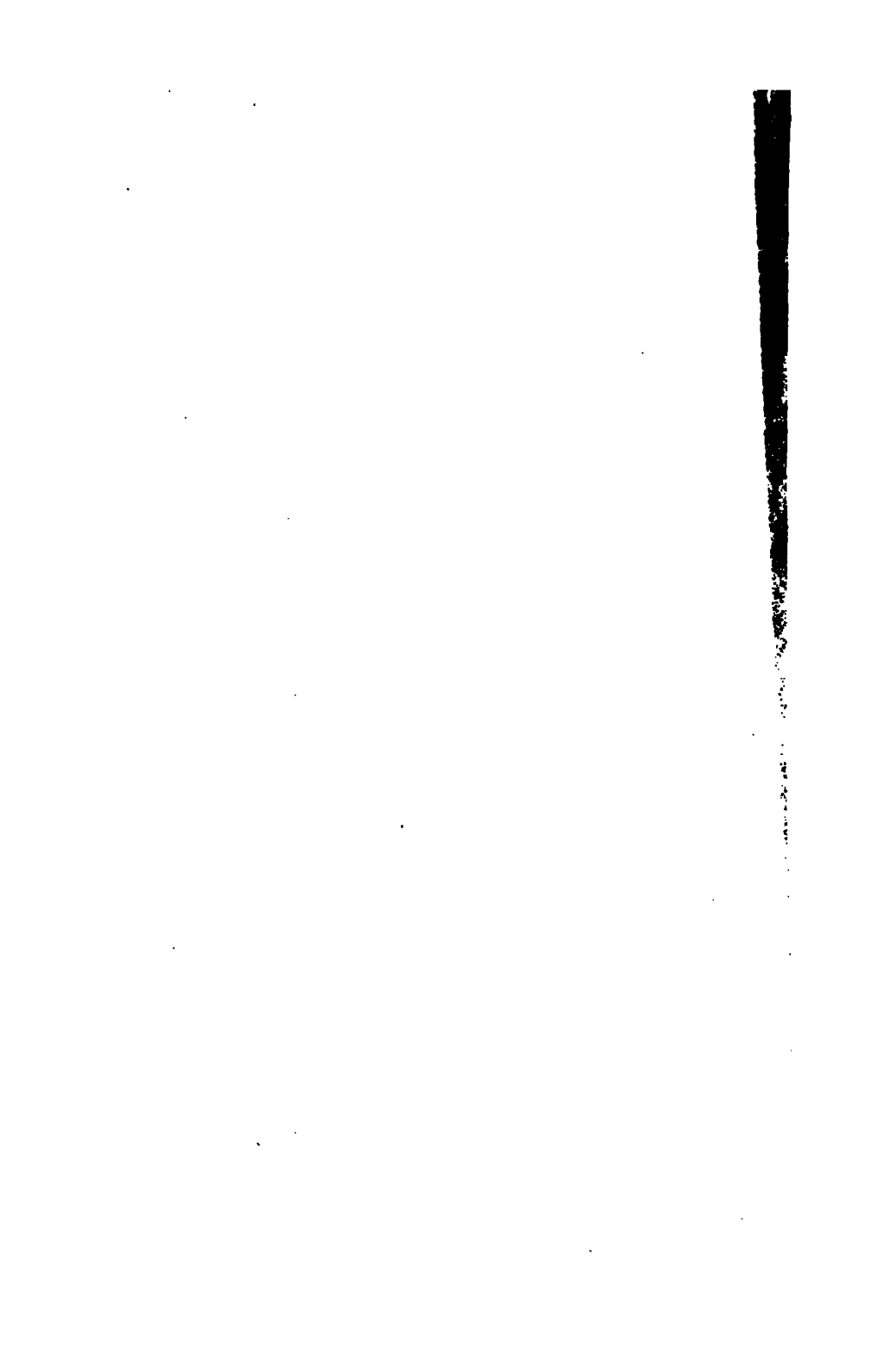







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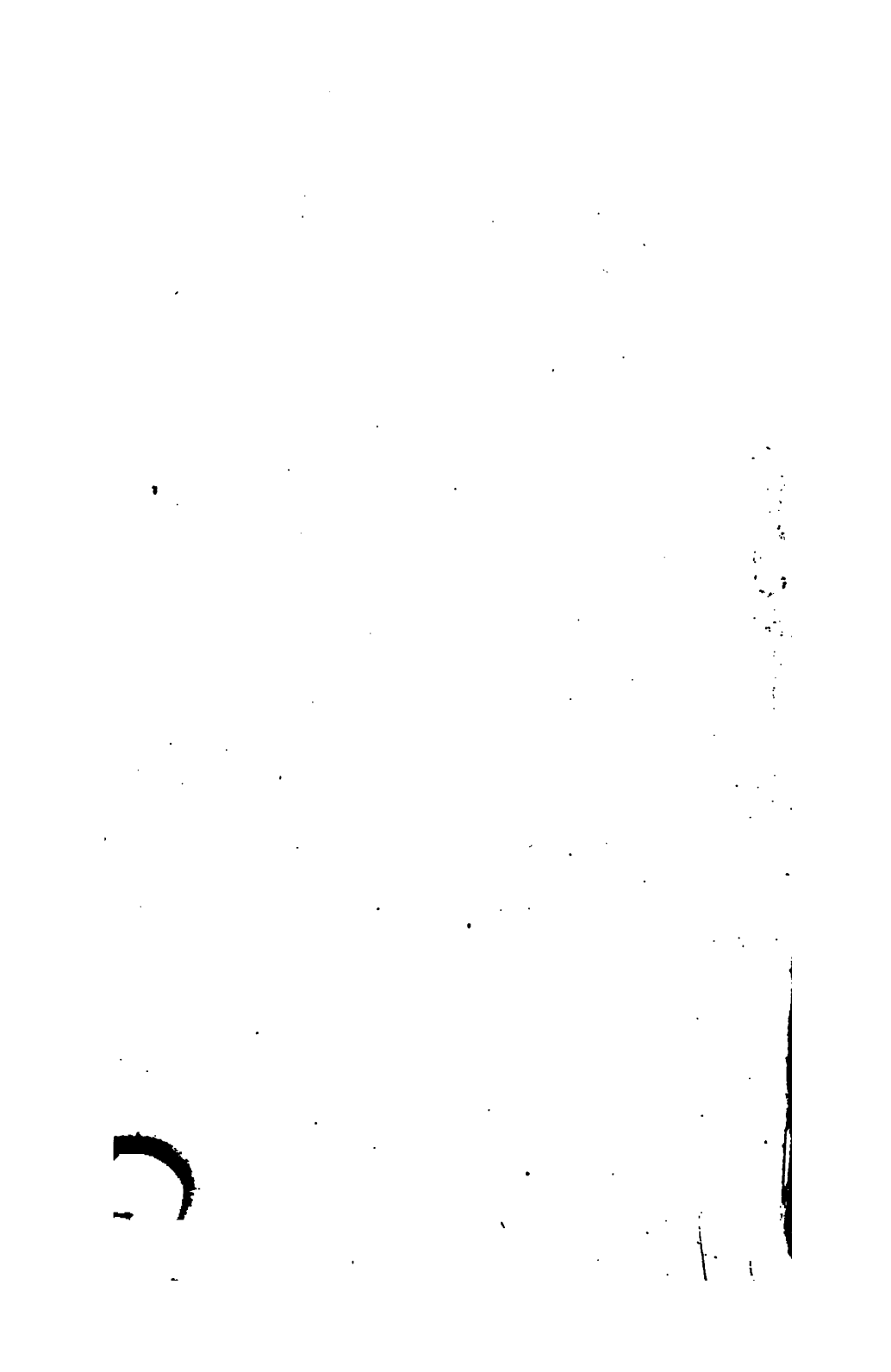
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Dr. Woodward's "Natural History of the Fossils of England" appeared in 1729. This work was based on a systematic collection of fossils which he had brought together, and which he subsequently bequeathed to the University of Cambridge, where it is still preserved, with his arrangement carefully retained. This descriptive part of this work is interesting, but his conclusions are made to coincide strictly with the Scriptural account of the creation and deluge. He had previously stated, in another work, that he believed, "the whole terrestrial globe to have been taken to pieces and dissolved at the flood, and the strata to have settled down from this promiscuous mass." In support of this view, he stated that, "Marine bodies are lodged in the strata according to the order of their gravity, the heavier shell in stones, the lighter in chalk, and so of the rest." (Essays toward a Natural History of the Earth. 1695.)



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JOSEPH*CKEIGH*UN*

An ESSAY towards a
Natural History
 OF THE
EARTH,
 AND
Terrestrial Bodyes,
 ESPECIALLY
MINERALS:
 As also of the
SEA, RIVERS, and SPRINGS.
 With an Account of the
UNIVERSAL DELUGE:
 And of the *Effects* that it had upon the
EARTH.

By JOHN WOODWARD, M. D. *Professor of*
Physick in Gresham-College : Fellow of the Col-
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The PREFACE

Gravity, those which are heaviest lying deepest in the Earth, and the lighter Sorts (when there are any such in the same Place) shallower or nearer to the Surface: and both those and these amongst Terrestrial Matter which is of the same specifick Gravity that they are, the heavier Shells in Stone, the lighter in Chalk, and so of the rest; I say, whoever shall but rightly weigh all this, he'll have no Need to go further for Proof that the Earth was actually so dissolv'd, and afterwards framed anew, in such Manner as I have set forth. And if to this he shall think fit to add the other Arguments of the same Thing which he will meet with in their Place, they also will, I hope, not fail of doing their Part in convincing him still more of the Truth and Certainty of this Matter.

THE other Instance I make Choice of shall be of the Universality of the Deluge, which is another Proposition that I insist upon. And for this, let but the Reader please to consider, what I deliver from authentick Relations, that

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that the marine Bodies aforesaid are found in all Parts of the known World, as well in Europe, Africa, and America, as in Asia, and this even to the very Tops of the highest Mountains : and then I think he cannot reasonably doubt of the Proposition ; but more especially if hereunto he shall joyn what I offer concerning the Great Abyss, and thence learn that there is at this Day resident, in that huge Con-ceptacle, Water enough to effect such a Deluge, to drown the whole Globe, and lay all, even the highest Mountains under Water. But if he should be at a Loss to know how I got such Notice of that subterranean Reservoir as to enable me to make a Computation of the Quantity of Water now conceal'd therein, if he carefully peruse the Propositions concerning Earth-quakes, and some others, in the Third Part, he cannot but discover at least some of the ~~Keys~~ ^{Keys} whereby I got Light thereinto : and at the same Time find why it is that I am so particular in relating the Phœnomēna of Earth-quakes, and dwell so long upon that Subject in this shorter Work.

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THESE I intend for Example and Direction to the Reader how he may satisfy himself in any of the other Heads. 'Tis impossible for me to foresee the Difficulties and Hesi-tations of every one; they will be more or fewer, according to the Capacity of each Peruser, and as his Penetra-tion and Insight into Nature is greater or less. Those who have Attention enough to take in the intire Platform as here laid down: who see the Chain which runs through the whole: and can pick up and bear in Mind the Observations and Proofs here and there as they lie, and then confer them with the Propositions, will discern, in great Measure, how those Propositions flow from them; but they, who cannot so easily do this, must be intreated to have a little Patience, untill the Thing be farther unfolded, and more amply and plainly made out.

A FEW advances there are, in the following Papers, tending to as-sert the Superintendence and Agency of
of

THE PREFACE.

of Providence in the natural World: as also to evince the Fidelity and Exactness of the Mosaic Narrative of the Creation, and of the Deluge. Which 'tis not improbable but some may be apt to stumble at, and think strange that, in a Physical Discourse, as this is, I should intermeddle with Matters of that Kind. But I may very safely say, that, as to the former, I have not enter'd farther into it than meerly I was lead by the Necessity of my Subject: nor could I have done less than I have, without the most apparent Injury and Injustice to Truth. And for Moses, he having given an Account of some Things which I here treat of, I was bound to allow him the same Plea that I do other Writers, and to consider what he hath deliver'd. In order to this I set aside every Thing that might byass my Mind, over-awe, or mislead me in the Scrutiny: and therefore have Regard to him here only as an Historian. I freely bring what he hath related to the Test, comparing it with Things as now they stand: and finding his Account to be punctually

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*ally true, I fairly declare what I find;
wherein I do him but simply Right,
and only the same that I would to a
common Historian, to Berosus or Ma-
netho, to Herodotus or Livy, on
like Occasion.*



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PART.

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*aly true, I fairly declare what I find;
wherein I do him but simply Right,
and only the same that I would to a
common Historian, to Berosus or Ma-
netho, to Herodotus or Livy, on
like Occasion.*



The



*An Account of the Ob-
servations upon which
this Discourse is foun-
ded.*

FROM a long Train of Ex-
perience the World is at
length convinced that Ob-
servations are the only sure Grounds
whereon to build a lasting and sub-
stantial Philosophy. All Parties are
so far agreed upon this Matter, that
it seems to be now the common Sense
of Mankind.

For which Reason I shall, in the
Work before me, give my self up to
be guided wholly by *Matter of Fact*;
as intending to steer that Course
which is thus agreed of all Hands
to be the *best* and *surest*: and not to
offer any thing but what hath due
Warrant from *Observations*: and
those both carefully made, and
faithfully related.

And

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And that each Reader may the better inform himself, not only of *what Sort* my present *Observations* are, but see in what *Manner* also, and with what kind of *Accuracy* they were made, 'twill be convenient to give some *Light* into that *Matter*, and to begin with an *Account* of them; whereby he may be enabled to judge how far they may be *rely'd* upon, and what *Measure* of *Assent* the *Propositions* which I draw from them may claim.

But before I go any farther, I ought to put in a *Caution*, that an *ample* and *prolix* *Relation* either of the *Observations* themselves, or of the *Deductions* from them, is not to be expected here. I intend *this* but for a *Scheme* of a *larger Design*, and as a *Sample* of what I hope, in good Time, more fully to discuss and make out; proposing no more, in *this Treatise*, than only, in a few plain Words, to deliver my *Sentiments* on certain *Heads* of *Natural History*, with some of the *Reasons* and *Grounds* of them, in order to give somewhat of present Satisfaction to the Curiosity and Demands of some of my Friends.

The

of the Earth.

The *Observations* I speak of were all made in *England*; the far greatest Part whereof I travell'd over on purpose to make them; professedly searching *all Places* as I pass'd along, and taking a careful and exact View of *Things* on all Hands as they presented; in order to inform my self of the *present Condition* of the Earth, and all *Bodies* contain'd in it, as far as either *Grotto's*, or other *Natural Caverns*, or *Mines*, *Quarries*, *Colepits*, and the like, let me into it, and displayed to Sight the *interiour Parts* of it. Nor, in the mean Time, did I neglect the *exteriour or Surface*: and such *Productions* of it as any where occur'd, *Plants*, *Insects*, *Sea*, *River*, and *Land Shells*: and, in a Word, whatever either the *Vegetable* or *Animal World* afforded.

Neither did I confine these *Observations* to *Land*, or the *Terrestrial Parts* of the *Globe* only, but extended them to the *Fluids* of it likewise, as well those within it, the *Water* of *Mines*, of *Grotto's*, and other such like *Recesses*, as those upon the *Surface* of it, the *Sea*, *Rivers*, and *Springs*.

My

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My principal Intention indeed was to get as compleat and satisfactory Information of the whole *Mineral Kingdom* as I possibly could. To which End I made strict Enquiry wherever I came, and laid out for Intelligence of *all Places* where the *Entrails* of the *Earth* were laid open, either by Nature, (if I may so say) or by Art, and humane Industry. And wheresoever I had Notice of any considerable *natural Spelunca* or *Grotto*: any sinking of *Wells*: or digging for *Earths, Clays, Marls, Sand, Gravel, Chalk, Gole, Stones, Marble, Ores of Metalls, or the like*, I forthwith had recourse thereunto; where taking a just Account of every observable *Circumstance* of the *Earth, Stone, Metall, or other Matter*, from the *Surface* quite down to the *Bottom* of the *Pit*, I enter'd it carefully into a *Journal*, which I carry'd along with me for that Purpose. And so passing on from Place to Place, I noted whatever I found memorable in each particular *Pit, Quarry, or Mine*: and 'tis out of these *Notes* that my *Observations* are compil'd.

After

After I had *finish'd* these *Observations*, and was *returned* back to this City, such were the *Commutations* which then so unhappily disturbed all *Europe*, that I saw I must necessarily desist here, and sit down (for the present at least) with what I had already done ; having little Prospect of an Opportunity of *carrying on* these *Observations* any *farther*, or of going *beyond Seas*, to consider the *State* of the *Earth*, and of all Sorts of *Fossils*, in more *distant Countries*.

But to *supply*, as far as possible, that *Defect*, I made Application to *Persons* who had already *travelled*, and I knew were of such *Integrity*, that they would not impose *uncertain* or *false Relations* upon me : as also of so much *Curiosity* as to be likely to give me some tolerable *Insight* into the Condition of *these Things* in *Foreign Regions*. I likewise drew up a *List* of *Quaries* upon this Subject ; which I dispatch'd into all Parts of the *World*, far and near, wherever either I my self, or any of my Acquaintance, had any

B Friend

Friend resident to transmitt those *Quaries* unto.

The Result was, that in time I was abundantly assured, that the *Circumstances* of these Things in *remoter Countries* were much the same with those of ours *here*: that the *Stone*, and other *terrestrial Matter*, in *France*, *Flanders*, *Holland*, *Spain*, *Italy*, *Germany*, *Denmark*, *Norway*, and *Sweden*, was distinguish'd into *Strata*, or *Layers*, as it is in *England*: that those *Strata* were divided by *parallel Fissures*: that there were enclosed in the *Stone*, and all the other denser kinds of *terrestrial Matter*, great Numbers of *Shells*, and other Productions of the *Sea*; in the same Manner as in *that* of *this Island*. To be short, by the same Means I got sufficient Intelligence that these Things were found in like Manner in *Barbary*, in *Egypt*, in *Guiney*, and other Parts of *Africa*: in *Arabia*, *Syria*, *Persia*, *Malabar*, *China*, and other *Asiatick* Provinces: in *Jamaica*, *Barbadoes*, *Virginia*, *New-England*, *Brasil*, *Peru*, and other Parts of *America*. But I reserve the more particular

of the Earth.

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particular Relation hereof to its proper Place.

So that though my own *Observations* were confined to *England*, yet by this Means I was made acquainted with the State of *these Bodies* in other Countries; even in almost all Parts of the *World* wherewith the *English* maintain any Commerce or Correspondence: and learn'd, from all Hands, that the State of them *there* was conformable to that of ours *here*, in the main, and as far as I shall lay any Stress upon it in my *Conclusions*; which indeed are not built upon any *Niceties*, or solitary and uncommon *Appearances*, but on the most simple and obvious *Circumstances* of these terrestrial *Bodies*.

As to the *Certainty* and *Accurateness* of my *Observations*, thus much may modestly and very truly be said, that I do not offer *any one* before I had first thoroughly and clearly *informed* my self in all material *Circumstances* of it: and had Opportunity of observing it in *more Places* than *one*, that I might be satisfy'd there was nothing *casual* or

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contingent

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contingent in any of those Circumstances. This will not be thought an over-great *Exactness*, or any thing more than was *needful*, by those who have noted how much *Philosophy* hath *suffered* by the *Neglect* and *Oversight* of some *Naturalists* in this Respect. A *transient* and *perfunctory Examination* of Things, frequently leads Men into considerable *Mistakes*, which a more *correct* and *rigorous Scrutiny* would have detected and avoided. The Truth is, I have been the more scrupulous and wary in regard the *Inferences* drawn from these *Observations* are of some *Importance*. 'Twas but necessary that the *Foundation* should be *firm*, when a *Superstructure* of *Bulk* and *Weight* was to be rais'd upon it. And therefore I advance nothing from any *Observation* that was not made with this *Caution*, and that any Man may not, as well as my self, without any great Pains, inform himself of the Truth of. Now, as long as the next *Cole-pit*, or *Mine*, the next *Quarry*, or *Chalk-pit*, will give abundant *Attestation* to what I write, *these* are so ready and

and obvious in almost all Places, that I need not be any where far to seek for a *Compurgator* : and to these I may very safely appeal.

Concerning the *Observations* themselves therefore, there cannot well arise any *Doubt* but what may easily be satisfy'd : and what I propose in this *Essay* being founded upon these *Observations*, every Reader will be Judge of the *Truth* and *Probability* of it, and whether that which I do so propose naturally follows from them or not.

I shall distribute them into two general *Classes* or *Sections*, whereof the former will comprehend my *Observations* upon all the *Terrestrial Matter* that is naturally disposed into *Layers*, or *Strata* ; such as our common *Sand-Stone*, *Marble*, *Cole*, *Chalk*, all Sorts of *Earth*, *Marle*, *Clay*, *Sand*, with some others.

Of this various Matter, thus formed into *Strata*, the far greatest Part of the *Terrestrial Globe* consists, from its *Surface* downwards to the greatest *Depth* we ever dig or mine. And it is upon my *Observations* on this that I have grounded all my general

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Conclusions concerning the *Earth* : all that relate to its *Form* : all that relate to the *Universal* and *other Deluges* : in a Word, all that relate to the several *Vicissitudes* and *Alterations* that it hath yet undergone. Nay, upon the same Observations I have also founded several *Conclusions* touching *Metalls*, *Spar*, and other *Minerals*, which are found lodged either in these *Strata*, amongst the Sand, Chalk, Earth, and the rest : or in the *perpendicular Intervalls* of the *Strata* of Stone, Marble, or other solid Matter.

For upon the *particular* Observations on the said *Metallick* and *Mineral Bodies*, (which are the Subjects of the *second Section*.) I have not founded any thing but what purely and immediately concerns the *Natural History* of *those Bodies*.

To proceed therefore to the Account of my Observations upon *Sand-stone*. And in *these*, though I do not neglect to note the *several Kinds* or *Varieties* of it : *Free-stone*, *Ragg-stone*, *Lime-stone*, and the rest : the different *Hardness*, or *Solidity*, of each : as also its *Colour*,
Texture,

of the Earth:

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Texture, and the *peculiar Matter* which constitutes it; yet I confine my self more strictly to consider the *Manner* how 'tis *disposed* in the *Earth*: the *Strata*, into which, by means of *horizontal* * and parallel *Fissures*, it is divided: the *Order* and *Number* of these *Strata*: their *Situation* in respect of the *Horizon*: the *Thickness*, *Depth*, and other *Circumstances* of each: the *Interruptions* of the *Strata*, I mean the *perpendicular* * *Fissures*, which intersect the *horizontal* ones: the different *Capacity* or *Largeness* of these *perpendicular Intervalls*: their *Distances* from each other: and the *Spar*, and other *Mineral* and *Metallick Matter*, usually contained in them.

But, because I saw that *Deductions* of considerable *Import* and *Consequence* might be drawn from them, I have with great *Care* and *Intention* observed the *Condition* of such *heterogeneous*

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rogeous

*. *. I call those *Fissures*, which distinguish the Stone into *Strata*, *Horizontal* ones: and those which intersect these, *Perpendicular*; not so much with respect to the *present Site* of the *Strata*, which is alter'd, in many *Places*, and now much different from their *original Situation*, concerning which, see *Part 2. Sect. 5, & 6.*

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ogeneous Bodies, which I found immersed and included in the *Mass* of this *Sand-stone*; particularly the *Shells* of *Oysters*, *Muscles*, *Scallops*, *Cockles*, *Periwinkles*, and very many other *marine Productions*. I have,* I say, very diligently noted all *Circumstances* of these *Shells*: the vast *Numbers* of them: the several *Kinds* that are thus lodged in the *Substance* of the *Stone*: the *Order* and *Manner* of their *Position* in it: the several *Depths*, at which they are found: the *Matter* which they contain in them, and wherewith their *Cavities* are usually filled.

These *Observations* about *Stone* are succeeded by others, of like *Nature*, concerning *Marble*, *Coal*, and *Chalk*: their *Fissures*: the *Situation* of their *Strata*: the *Shells*, and other *heterogeneous Bodies* lodged therein.

In the next Place, those which concern *Marle*, *Clay*, the several *Kinds* of *Earth*, *Sand*, and some other *Fossils*: the *Shells* and other like *Bodies*, lodged in their *Strata*: the *Position* of those *Strata*: their *Order*: their *Distinctions* from each other, by the *Difference* of the *Matter*

Matter of each, and by its different *Consistence* and *Colour*; the *Strata* of these *laxer* Kinds of *Matter* being not ordinarily *divided* from each other by *Interposition* of *horizontal Fissures*, as those of *Stone*, and such other *solid Matter*, constantly are.

And lastly, those which relate to the upper or outmost *Stratum* of all; I mean that *blackish Layer* of *Earth* or *Mould* which is called by some *Garden-Earth*, by others *Under-turf-Earth*, wherewith the *Terrestrial Globe* is almost every where *invested*, unless it be disturbed, or flung off by *Rains*, *Digging*, *Plowing*, or some other external *Force*; insomuch, that whatsoever lies deeper, or underneath, whether *Stone*, *Marble*, *Chalk*, *Gravel*, or whatever else, *this Stratum* is still expanded at *Top* of all; serving, as it were, for a *common Integument* to the rest: and being (as shall be shewn in due Place*) the *Seminary* or *Promptuary* that furnisheth forth *Matter* for the *Formation* and *Increment* of *Animal* and *Vegetable Bodies*;

* Part. V. Confess. 1.

Bodies ; and into which all of them successively are again finally *returned*.

The *Observations* being thus dispatch'd, my next Step should have been to have proposed the *Deductions* from them : to have determin'd how these *Sea-Shells* were brought to *Land*, and how they became inter'd in the Bowels of the *Earth*, in the Manner described in those *Observations*. But, before I could proceed any farther towards *that*, I found my self necessarily obliged to take off a *Difficulty* started by some *learned Men* who have wrote now *lately* upon the Subject, and assert that these *Shells* are not *real* : that they were never bred at *Sea* : but are all of *Terrestrial Original*, being *meer Stones*, though they bear a Resemblance of *Shells*, and formed, in the *Places* where they are now *found*, by a kind of *Lusus* of *Nature*, in Imitation of *Shells*.

How nearly I am concerned to *remove* this *Obstacle*, before I pass on any farther to the Prosecution of my *Design*, any one may presently see. For to go about to enquire at *what Time*, and by *what Means*

Means these *Shells* were conveyed out of the *Sea* to dry *Land*, when a *Doubt* hath been moved whether they are *Shells* or not, or ever belonged to the *Sea*, without first clearing this *Matter*, and putting it quite out of *Doubt*, would be very absurd. In order therefore unto this, I premise,



A Differ-



*A Dissertation concern-
ing Shells, and other marine Bo-
dies, found at Land; Proving
that they were originally gene-
rated and formed at Sea: that
they are the real Spoils of once
living Animals: and not Stones,
or natural Fossils, as some late
Learned Men have thought.*

IN my Extract of this Dis-
sertation I shall fairly, and
in as little Compass as may
be, lay before the Reader, first the
Arguments that have been urged by
those Writers to perswade us that
these *Bodies* are meer *Mineral Sub-
stances*. And having detected the
Insufficiency of them, by evincing
how far they are from being *con-
clusive*, and how much they fall
short of *proving* what they are al-
leged for, I shall then proceed to
lay

lay down a brief Scheme of *my own*, and offer some of the *Reasons* which have induced me to believe that these are the very *Exuvia* of *Animals*, and all owing to the *Sea*.

I would not be thought to insinuate that the *Opinion* of *those Gentlemen* carries no Shew of *Truth*, nor Umbrage of *Reason* of its Side. 'Tis not to be supposed, that *Persons* of their *Learning* and *Abilities* would ever have espoused it, were it not in some Measure *plausible* : and had not at least a fair Appearance of *Probability*. The very finding these *Bodies* included in *Stone*, and lodged in the *Earth* together with *Minerals*, was alone enough to move a Suspicion that *these* were *Minerals* too. The finding them even to the very *Bottom* of *Quarries* and *Mines* : in the most retired and *inward Parts* of the most *firm* and *solid Rocks* : in the *deepest* Bowels of the *Earth*, as well as upon the Surface of it : upon the *Tops* of even the *biggest Hills* and *Mountains*, as well as in the *Valleys* and *Plains* : and this not in this or that *Province* only, not only in one or two *Fields*,
but

but almost *every where* : in *all Countries* and *Quarters* of the *Globe*, wherever there is any *digging* for *Marble*, for *Stone*, for *Chalk*, or any other *Terrestrial Matter* that is so *compact* as to fence off *external Injuries*, and shield them from *Decay* and *Rottenness*. *This*, toge-

1. "ther with their being lodged in
 " company of the *Belemnites*, *Selenites*, *Marchasits*, *Flints*, and
 " other like *Bodies*, which were
 " incontestibly *natural Fossils*, and,
 " as *they* supposed, in the *Place* of
 " their *Formation*," was enough to
 stagger a *Spectator*, and make him
 ready to entertain a *Belief* that
these were so too. 'Tis a *Phænomenon*
 so surprizing and extraordinary,
 that 'tis not strange that a *Man*
 should scarcely credit his very *Senses*
 in the *Case*: that he should more
 readily incline to believe that they
 were *Minerals* as the *Belemnites*,
 and the others recited, are: or in-
 deed almost any thing else rather
 than *Sea-Shells*; especially in such
Multitudes, and in *Places* so unlik-
 ely: so *deep* in the *Earth*, and *far*
 from the *Sea*, as these are common-
 ly found. Nor

Nor was this, as indeed they tell us, the only *Difficulty* these worthy Persons had to surmount ; “ They found, together with *these*, certain *Bodies* that bore the *Shape* and resemblance of Cockles, Muscles, and other *Shells*, which yet were *not really* such ; but consisted intirely, some of them, of *Sand-stone* : others of *Flint* : and others of *Spar* : or some other kind of *Mineral Matter*.”

2.

Nay, they met with some, “ That were in all Appearance *Shells* : that were of the same *Bigness*, *Figure*, and *Texture*, with the common *Echini*, *Scallops*, and *Perewinkles* ; but had notwithstanding *Flint*, *Native-Vitriol*, *Spar*, *Iron-Ore*, or other *Metallick* or *Mineral Matter*, either adhering firmly in *Lumps* to the *Outsides* of them, or insinuated into their *Substance*, into their *Pores*, and *inner Parts*, so as to disguise them very much, and give them a *Face* and *Mien* extremely unlike to that of those *Shells* which are at *this Day* found at *Sea*.”

3.

They

4. They observ'd also, that "amongst the *Shells*, that were *fair*,
 "unaltered, and free from such *Mineral Insinuations*, there were some
 "which could not be *match'd* by
 "any Species of Shell-fish now
 "found upon the *Sea-Shores*.

5. And that on the contrary, "there
 "were several *Shells* found commonly upon the said *Shores*, such
 "as the larger Shells of the *Buccina*, of the *Concha Veneris* : of
 "*Crabs*, *Lobsters*, and others, both
 "of the *Crustaceous* and *Testaceous*
 "*Kinds*, which yet we never meet
 "with *at Land*, or in our *Quarries*."

Nay there were some other *Difficulties* which they have urged, and which (though they be of *lesser Weight*) shall all of them be recounted and considered more particularly in due Place.

Upon the whole therefore 'tis very plain, that these Authors did not espouse *this Opinion* without some *Grounds*, without some countenance of *Probability* : and that they have charged the *opposite* with a large crowd of *Difficulties*. Yea so far are they from being destitute of

of an handsome *Apology*, that they very well deserve the *Thanks* of the *World* for what they have done. For, although they have not succeeded in their *Attempts* about the *Origin* of *these Bodies*, they have made *Discoveries* in other *Respects* concerning *them*, and in *other Parts* of *Nature* likewise, of that *Moment* and *Consequence*, as to have thereby laid a great and lasting *Obligation* upon the intelligent and discerning Part of *Mankind*.

But that they have failed notwithstanding in *this Enterprize*, 'tis, I think, not over difficult to *prove*. And *this* is the Subject of the present *Discourse*. Wherein I hope to make out, that the *Sea* gave Birth to *these Bodies**: that *they* are so far from being formed in the *Earth*, or in the *Places* where they are now found, that even the Belemnites, Selenites, Marchasits, Flints, and other natural *Minerals*, which are lodged in the *Earth*, together with *these Spells*, were not formed *there*, but had *Being* before ever they came *thither*: and were fully formed and

I.

* *Vid. Pag.*
23, 24,
Ec. infra.

C

finished

† Confer. *finished* before they were reposed in
Part. IV, that Manner.†
Consect. 2.

2. That the above mentioned *Bodies* which consist of *Stone*, of *Spar*, *Flint*, and the like, and yet carry a *Resemblance* of *Muscles*, *Cockles*, and other *Shells*, were originally formed in the *Cavities* of *Shells* of those *Kinds* which they so resemble; these *Shells* having served as *Matrices* or *Moulds* to them; the *Sand*, *Sparry*, and *Flinty Matter*, being then *soft*, or in a *State of Solution*, and so, susceptible of any *Form*, when it was thus introduced into these *Shelly-Moulds*: and that it consolidated, or became *hard* afterwards*.

* Concerning these
Myitæ,
Cochlitæ,
&c. See
Part 4.
Conf. 2. &
Part 5.
Conf. 5.
infra.

3. That for the *Metallick* and *Mineral Matter* which sometimes adheres to the *Surfaces* of these *Shells*, or is intruded into their *Pores*, and lodged in the *Interstices* of their *Fibres*, 'tis all manifestly *adventitious*†; the *Mineral Particles* being plainly to be distinguished from the *testaceous* ones, or the *Texture* and *Substance* of the *Shell*, by good *Glasses*, if not by the naked *Eye*. That though the Thing had been so that this *Accretion* had not been thus discernible, and

† Part 4.
Conf. 2.
infra.

and consequently the *Alteration* of these *Shells* could not have been accounted for, so that we had been perfectly in the dark as to the Origin of the Bodies thus *alter'd*, and that nothing at all could have been determined concerning *them*; yet *this* would not have been any the least *Impediment* or *Objection* against that which I insist upon; there being so *very few* of *these* in Comparison of *those* which have undergone no such *Alteration*. There being, I say, besides *these*, such vast *Multitudes* of *Shells* contained in *Stone*, &c. which are *intire*, *fair*, and absolutely free from any such *Mineral Contagion*: which are to be *match'd* by others at this Day found upon our *Shores*, and which do not *differ* in any Respect from them; being of the *same Size* that those are of, and the *same Shape* precisely: of the *same Substance* and *Texture*; as consisting of the *same peculiar Matter*, and this constituted and disposed in the *same Manner*, as is that of their respective Fellow-kinds at *Sea*: the *Tendency* of the *Fibres* and *Stria* the same; the *Composition*

The Natural History

of the *Lamellæ*, constituted by these *Fibres*, alike in both : the same *Vestigia* of *Tendons* (by Means whereof the Animal is fastned and joyned to the *Shell*) in each : the same *Papilla* : the same *Sutures*, and every thing else, whether *within* or *without* the *Shell*, in its *Cavity*, or upon its *Convexity*, in the *Substance*, or upon the *Surface* of it. Besides, these *Fossil Shells* are attended with the ordinary *Accidents* of the *marine ones*, *ex. gr.* they sometimes grow to one another, the *lesser Shells* being fixed to the *larger* : they have *Balani*, *Tubuli vermiculares*, *Pearls*, and the like, *still* actually growing upon them. And, which is very considerable, they are most exactly of the same *specifick Gravity* with their Fellow-kinds now upon the *Shores*. Nay farther, they answer all *Chymical Tryals* in like Manner as the *Sea-Shells* do : their *Parts* when *dissolved* have the same *Appearance* to View, the same *Smell* and *Taste* : they have the same *Vires* and *Effects* in *Medicine*, when inwardly administered to Animal Bodies : *Aqua fortis*, Oyl of *Vitriol*, and other like
Menstrua,

Menstrua, have the very same Effects upon both. In a Word, so exactly conformable to the *marine ones* are these Shells, Teeth, and Bones, which are *digged* up out of the *Earth*, that though several *Hundreds* of them, which I now keep by me, have been nicely and critically examined by very many *Learned Men*, who are skill'd in all Parts of *Natural History*, and who have been particularly curious in, and conversant with *Shells*, and other *marine Productions*, yet never any Man of them went away *dissatisfy'd*, or *doubting* whether these are really the very *Exuvia* of Sea-fishes or not. Nay, which is much more to my Purpose, some of the most *eminent* of those very *Gentlemen*, who formerly were *doubtful* in this *Matter*, and rather inclinable to believe that these were *natural Minerals*, and who had *wrote* in Defense of that *Opinion*, do, notwithstanding, upon strict and repeated *Inspection* of these *Bodies* in my *Collection*, and upon farther *Enquiry*, and Procuration of plain and *unalter'd* Shells from several Parts of this *Island*, fully as-

sent to me herein, and are now convinced that these are the real *Spoils* and *Remains* of *Sea-Animals*. And, being thus satisfy'd, such is their *Ingenuity*, and so great their Affection to *Truth*, that they have personally requested me to *publish* my *Thoughts* in order to the fuller *clearing* of this *Matter*. But, to proceed,

4. That although I can *pair*, with *Sea-Shells*, several of these *Fossil ones* that those *Gentlemen* have pronounced altogether *unlike* any thing that the *Salt-Water* produceth, yet 'tis indeed very true that there are found *some Shells*, at *Land*, in *Stone*, and in *Chalk*, which cannot probably be *match'd* by any *Species* of *Shells* now appearing upon our *Shores*. But, notwithstanding this, I cannot but affirm that *these*, even the most strange and enormous of them, have all the essential *Notes* and *Characters* of *Sea-Shells*, and shew as near a *Relation* to some now extant upon the *Shores* as the different *Species* of *those* themselves do to one another: that they are of the very same *specifick Gravity* with those to which they are so generically

cally allied ; and of the same *Texture* and *Constitution* of Parts ; the *Substance* of *these* being as plainly *Testaceous*, as *that* of *those* is ; inso-
much that any Man that compares
them, can no more *doubt* of the
Reality of the *one* than of the *other*.
Whence it must needs follow, that
there were such Shell-fish *once in*
Being ; which is enough for my Pur-
pose ; I being no ways concerned to
make out that there are of the same
Kinds *still actually living* in the *Ocean*.
Though if I *was*, 'twould be no
very hard Task ; it being evident
from the *Relations* of *Dyvers*, and
Fishers for *Pearls*, that there are
many Kinds of *Shell-fish* which lye
perpetually *concealed* in the *Deep*,
screen'd from our Eyes by that vast
World of *Water*, and which have
their continual *Abode* at the *Bottom*
of the *Ocean*, without ever ap-
proaching *near* the *Shores* ; it being
as unnatural for *these* to desert this
their *native Station*, as 'tis for *those*
that are the *Inhabitants* of the *Shores*
to quit *theirs*, and retire into the
Deep. For this Reason *these* are
called by Naturalists *pelagici*, and

Pelagia : as the *others*, that reside nearer to the Shores, are by them called *Littorales*. Now the Shells which we find *exposed* upon our Shores, are only those which are cast up and stranded by *Tides* and by *Storms* : and consequently are all of them *Exuvia* of those *Kinds* that *live* near the Shores, and not of those that inhabit the *Main*, or the deeper and remoter Parts of the Ocean ; it being certain from the *Relations* also of *Divers*, that the *Tides* and *Storms*, even the most tempestuous and turbulent, affect only the *superficial* Parts of the Ocean, the *Shallows*, and *Shores*, but never reach the greater *Depths*, or disturb the *Bottom* of the *Main*. These are as quiet, and free from *Commotion* in the midst of *Storms*, as in the greatest *Calm*. So that the *Shell-fish*, which are resident in these Places, live and dye *there*, and are never dislodg'd or removed by *Storms*, nor cast upon the *Shores*, which the *Littorales* usually are. When therefore I shall have proved more at large, that those which we find at *Land*, that are not matchable with any
upon

upon our *Shores*, are many of them of *those very Kinds* which the fore-cited *Relations* particularly assure us are found no were but in the *deeper Parts* of the *Sea* : and that as well *those* which we *can match*, as *those* we *cannot*, are all *Remains* of the *Universal Deluge*, when the *Water* of the *Ocean*, being boisterously turned out upon the *Earth*, bore along with it *Fishes* of all Sorts, *Shells*, and the like moveable Bodies, which it left behind at its *Return* back again to its *Chanel* ; it will not, I presume, be thought *strange*, that, amongst the *rest*, it left some of the *Pelagia*, or *those Kinds* of *Shells* which naturally have their Abode at *Main-Sea*, and which therefore are now never flung up upon the *Shores*. And it may very reasonably be concluded, that all these *strange Shells*, which we cannot so *match*, are of these *Pelagia* : that the several *Kinds* of them are at *this Day* living in the *huge Bosom* of the *Ocean* : and that there is not any one intire *Species* of *Shell-fish*, formerly in *Being*, now *perish'd*, or *lost*.

That

5. That it is also very true that there are *some Shells*, such as those of the larger *Buccina*, and *Concha Veneris*, of *Lobsters*, *Crabs*, and others of the *crustaceous Kind*, that are very rarely found at Land; so *rarely*, that some of these Gentlemen have asserted that they are *never* found; but *that* I shall shew to be a *Mistake*, all the Shells in their whole *List* having been found in the *Earth* in one Place or other. But that these are very *seldom* found any where, I most readily grant; and this is so far from being an Argument against what I am going to advance, that 'tis as full and substantial a *Proof* of the *Truth* of it as I could possibly wish. For the Shells in *this List* are all *lighter* than *Stone*, *Marble*, and the other ordinary *Terrestrial Matter*. Now both *these*, and all other Sorts of *Shells* that are *so light*, occur very *seldom* at *Land*, or in the *Earth*, in comparison of the *Shells* of *Cockles*, *Perewinkles*, and the rest which are more *ponderous*, so as to equal the *Stone*, and the other *Terrestrial Matter* in *Gravity*. The Reason of
which

which will be very plain, when I shall have shewn * that at the time of the *Deluge* (when these Shells were brought out upon the Earth, and reposed therein in the Manner we now find them) *Stone*, and all other solid *Minerals* lost their *Solidity*: and that the sever'd Particles thereof, together with those of the Earth, Chalk, and the rest, as also Shells, and all other *Animal* and *Vegetable Bodies*, were taken up into, and sustained in, the *Water*: that at length all these subsided † again promiscuously, and without any other Order than that of the different *Gravity* of the several *Bodies* in this confused *Mass*; those which had the *greatest* degree of *Gravity* sinking down *first*, and so settling *lowest*; then those *Bodies* which had a *lesser Share* of it fell *next*, and settled so as to make a *Stratum* upon the *former*; and so on, in their *several Turns*, to the *lightest* of all, which subsiding *last*, settled at the *Surface*, and cover'd all the rest. Now this very various *Miscellany* of *Bodies* being determined to *Subsidence* in this Order meerly by their different *Gravities*,

* Vid.

Part 2.

Consect. 2.

† Vid.

Part 2.

Consect. 3.

Gravities
(Strata)

ties, all those which had the *same* degree of Gravity subsided at the *same* Time, fell into, and composed the *same* Stratum. So that those Shells and other Bodies, that were of the *same* Specifick Gravity with Sand, sunk down together with it, and so became inclos'd in the Strata of Stone, which that Sand form'd or constituted. Whilst those which were lighter, and of but the *same* Specifick Gravity with Chalk (in such Places of the Mass where any Chalk was) fell to the Bottom at the *same* Time that the Chalky Particles did, and so were entombed in the Strata of Chalk; and in like Manner all the rest. Accordingly we now find in the Sand-stone of all Countries (the specific Gravity of the several Sorts whereof is very little different, being generally to Water as $2\frac{1}{2}$ or $2\frac{2}{3}$ to 1) only those Concha, Pectines, Cochleæ, and other Shells that are nearly of the *same* Gravity, viz. $2\frac{1}{2}$ or $2\frac{2}{3}$ to 1. But these are ordinarily found enclos'd in it in prodigious Numbers; whereas of Oyster-shells, (which are in Gravity but as about

about $2\frac{1}{2}$ to 1) of *Echini* (which are but as 2, or $2\frac{1}{2}$ to 1) or the other *lighter Kinds* of Shells, scarce one ever appears therein. On the contrary, in *Chalk* (which is *lighter* than *Stone*, being but as about $2\frac{1}{2}$ to 1) there are *only* found *Echini*, and the other *lighter* Sorts of Shells; it being extremely unusual to meet with so much as *one single Shell* of any of all the *heavier Kinds* amongst *Chalk*; but for the said *Echini*, and other the *lighter* Sorts of Shells, they are very *numerous* and *frequent*, in all the *Chalk-pits* of *Kent*, *Surrey*, *Effex*, *Hartfordshire*, *Barksbire*, *Oxfordshire*, *Wiltshire*, and all others that I have search'd; being found indifferently in the *Beds* of *Chalk* from the *Top* quite down to the *Bottom* of the *Pit*; I having myself commonly observed them to the very *Bottom* of all, in *Pits* that were an *hundred foot deep*, and in *Wells* much *deeper*. To conclude, those *Shells*, and other *Bodies*, that were *still lighter* than these, and consequently *lighter* than *Stone*, *Chalk*, and the other *common Matter* of the *Earth*, such as the Shells of
Lobsters

Lobsters (which are but as $1 \frac{1}{2}$ to 1) of *Crabs*, ($1 \frac{1}{4}$ to 1) and the rest of the *Crustaceous Kind*: the *Teeth* and *Bones* of the *cartilaginous* and *squammose Fishes*, and many other *Bodies*, these I say would of Course *subside* last of all, and so, falling above the rest, be lodged *near*, if not *upon* the *Surface*; where, being continually exposed to *Weather*, and other *Injuries*, they must in tract of Time needs *decay* and *rot*, and at last quite *vanish* and *disappear*; and 'tis not to me any great *Wonder*, that at *this Distance* of four thousand Years, we find so *very few* of them remaining. So that I think I may now safely appeal to any ingenuous and impartial Looker on, whether this, [*That we find all those Kinds of Shells (now extant upon our Shores) which have nearly the same Gravity with Stone, and the other ordinary Matter of our Earth, that is so tight and compact as to preserve them, enclosed in great Plenty therein, and only those, the rest which are lighter being so very rarely found,*] can reasonably be supposed to have happened by *meer Chance*, with this

Constancy

- *Constancy and Certainty*, and that in *so many and distant Places* : as also, whether *this* be any *Objection* against my *Hypothesis* : or rather be not the *strongest* necessary *Confirmation* of it that could well be expected, or even desir'd.

To this *Dissertation* I shall subjoin an *Appendix*, which will consist of *several Sections*, touching the *Bodies* call'd *Unicornu Fossile*, *Lapis Judai-cus*, *Entrochus*, *Asteria*, or the *Star-stone-Columns* : with some farther *Reflections* upon the *Busonites*, *Glossopetra*, and *Cornu Ammonis* ; proving that *these*, and *several more*, which have been (for many Ages) reputed *Gemms*, and meer *Stones*, are really nothing else but the *Teeth*, *Bones*, and other *Parts of Sea-Animals*, and (as the rest were) left behind by the *Universal Deluge*.



PART.



PART I.



*An Examination of the
Opinions of former Writers on
this Subject. The Means where-
by they thought these Marine
Bodies brought out upon the
Earth. Of certain Changes
of Sea and Land, and other
Alterations in the Terraqueous
Globe, which they suppose to
have happen'd.*

THIS so considerable a Point
being thus gained: the *Le-
gitimacy* or *Reality* of these
Marine Bodies vindicated and assert-
ed: and my Way so far effectually
cleared by the foregoing *Disserta-
tion*; I now re-assume my original
Design,

Design, and pass on to inquire by what *Means* they were hurried out of the *Ocean*, the Place of their *native Abode*, to *dry Land*, and even to *Countries* very remote from any *Seas*.

It is indeed a *Question* of great *Antiquity* : and which hath, for many *Ages*, given no small *Fatigue* to *Learned Men*. Nor hath the *present* been less inquisitive into this *Affair* than the *former Ages* were. We have seen several *Hands* employed herein : and many of them very excellent ones too. • The great Number of the *Undertakers*, the *Worth* of some of them, and their *Zeal* to bring the Matter to a *Decision*, are sure *Arguments* of the *Dignity* and *Importance* of it : and, that it is not hitherto decided, is as certain a *Proof* of its *Difficulty*.

Some were of Opinion that these *Shells* were fetch'd from *Sea* by the *ancient Inhabitants* of those *Countries* where they are now found ; who, after they had used the included *Fishes* for Food, *flinging forth* the *Shells*, many of them became *petrified*, as they speak ; being
D thereby

thereby preserved down to our Times, and are the same which we at this Day find in our *Fields* and *Quarries*.

Others rather thought that they were only *Reliques* of some former great *Inundations* of the *Sea*; which, furiously rushing forth, and *overflowing* the adjacent Territories, bore these *Bodies* out upon the *Earth* along with it: but returning at length more leisurely and calmly back again, it *left* them all *behind*.

Many were of Opinion, that the *Sea* frequently flitted and *changed* its Place: that several Parts of the *Globe* which are now *dry Land*, and habitable, lay heretofore at the *Bottom* of the *Sea*, and were covered by it: that particularly the very *Countries*, which present us with these *Spoils* of it, were *anciently* in its *Possession*; being *then* an Habitation of *Sharks* and other *Fishes*, of *Oysters*, *Cockles*, and the like; but the *Sea*, in tract of Time, *retreating* thence, and betaking it self into *new Quarters*: gaining as much Ground on the *opposite Coasts*, as it lost upon *those*, left these *Shells* there

there as Marks of its *ancient Bounds* and *Seat*.

Amongst the rest there were indeed some who believed *these* to be *Remains* of the *General Deluge*: and so many Monuments of that calamitous and fatal *Irruption*. These last assuredly were in the *right*; but the far greater Part of them rather *asserted* than *proved* this: rather deliver'd it as their *Opinion*, than offer'd any *rational Arguments* to induce *others* to the same *Belief*. And for the *rest*, who did offer *any*, so *unhappy* were they in the *Choice*, and *unsuccessful* in the *Management* of them, by reason of the *Shortness* of their *Observations*, and their not having duely informed themselves of the *State* of these *Things*, that none of the other *Partizans* appear'd with less *Applause*, none less strenuously maintain'd their *Ground*, than *these* did.

The Truth is, as Matters were order'd amongst them, no Man could receive much *Light* or *Satisfaction* from what was advanced by any of them. They little more than clash'd with one another. Each could de-

D 2

molish

molish the others *Work* with Ease enough, but not a Man of them tolerably defend his *own*; which was sure never to outstand the first Assault that was made. Yea upon so equal *Terms* did they all stand, that no one could well lay claim to a larger Share of *Truth* for his Side: no one had a fairer Pretence of *Right*, than the rest. And, it being impossible to imagine that *all* could be in the *Right*, some *Learned Men* began to suspect that *none* of them were so.

These thereupon laid out on all Hands for some new *Expedient* to solve and put an End to the *Perplexity*. And 'twas this *last Effort* that brought forth the *Opinion*, that these *Bodies* are not what they seem to be: that they are *no Shells*, but meer *Sportings* of active *Nature* in this *subterraneous Kingdom*, and only Semblances or Imitations of Shells. They imagined that this *shortned* the *Difficulty*, because it spared them the Trouble of accounting for their *Conveyance* from *Sea*, which was what had so severely exercised all the former. Though, in reality,
this

Part I. of the Earth.

41

this only *beighthen'd* and *enbanſed* it :
and render'd it ſtill more *intricate* ;
as does in ſome Meaſure already,
and will hereafter appear more at
large, when I ſhall have publiſh'd
the *preliminary Diſſertation*, whereof
I have given ſome Account above.
And *this* was the *moſt received* and
prevalent Opinion * when I firſt
brought my *Collection* of theſe *Things*
up to *London*.

* *Vid.*
Ray's
Three Diſ-
courses 8°. *Lond.*
1693,
pag. 127.

There have been, beſides theſe
recited, ſome *other Conjeſtures* pro-
poſ'd about the removal of theſe
Bodies to Land ; which I chooſe,
rather than trouble the *Reader* with
a Detail of them here, to deferr to
their proper Place, that I may pro-
ceed directly onwards in my *Deſign*.
Now the more effectually to ſmooth
my *Way* : and that this very great
Diverſity of *Opinions* may not be any
longer an Amuſement to the *World*,
'twill be very convenient that I
look into the *Reaſons* and *Pretenſions*
of each : and ſhew upon what
Ground 'tis that I embrace that of
the *Deluge*, and ſet aſide *all the reſt*.

Why I adhere to them who ſup-
poſe theſe *Marine Productions* brought

out by the *Universal Deluge*, will be best learn'd from the *succeeding Part* of this *Essay*, which is wholly dedicated to that Purpose. And to that I shall prefix an *Historical Account* of the *Labours* of *Fab. Columna*, *Nic. Steno*, *P. Boccone*, *Jac. Grandius*, *Mr. John Ray*, and other *Learned Men*, on *this Subject*; shewing what they have *already done* in it, wherein they *failed*, and what remains *still* to be *done*.

Why I *reject* all the other *Conjectures*, falls under our *present Consideration*. And, to make as *short* of the Matter as possible, 'tis because they will none of them abide the *Test*. Because they have not due Warrant from *Observation*, but are clearly repugnant thereunto. In a Word, because the *present Circumstances* of these *Marine Bodies* do not square with *those Opinions*, but exhibit *Phænomena* that *thwart* them, and that give *plain Indications* that they could never have been put into the *Condition* we now find them by any such *short* and *partial Agents* as those they propose.

Now

Now in regard that the *said Circumstances* are impartially related in my *Observations*, we need only have recourse to *them* to put an *End* to this *Business*. For, as *Mathematicians* say of a *streight Line*, that 'tis as well an *Index* of its own *Rectitude*, as of the *Obliquity* of a *crooked* one ; so *these* may serve indifferently to detect the *erroneous Ways*, and to point forth the *true*. And it is from these *Observations**: from the *Number, Order, Variety, Situation, Depth, Distance from the Sea, and other Accidents* of *these Bodies**, that I shall shew,

That *they* were not brought, from *Sea*, to the *Parts* where they are now found, by *Men*, the *ancient Inhabitants* of those *Parts*, as *some Authors* have been of *Opinion* ; they presuming that these *Shells* were at first only flung out upon the *Surface* of the *Earth* : and that those which we now find *buried* in it, were, in tract of *Time*, *cover'd*, either by that *Terrestrial Matter* which falls down along with *Rain*, or by the

I.

D 4

Earth

*. *. See a brief Detail of these *Observations* in the Beginning of Part II.

Earth which is wash'd from off the *Hills* by *Land Floods*.

2. That *they* were not carry'd, together with the *Water* which some suppose to pass, continually, from the Bottom of the *Sea* to the Heads of *Springs* and *Rivers*, through certain *subterranean Conduits* or *Channels*, until the Shells were by some Glut, Stop, or other Means arrested in their *Passage*, and so detained in the *Bowels* of the *Earth*; as *others* have rather inclined to believe.

3. That *they* were not born forth of the *Sea*, and laid upon the *Land* by particular *Inundations*; such as were the *Ogygean*, the *Deucalionian*, and others of fresher Date: such as are *those* which usually attend *Earthquakes*: or those which are sometimes occasioned by very high *Tides*, by impetuous *Winds*, and the like; as *other Writers* have thought.

4. That *they* were not left behind at the *Beginning* of the *World*, when the *Sea* overspread the whole *Globe*, till its *Retreat* into its assigned *Channel*, and the *Waters* were gather'd together unto one place, * the third Day

* Gen. 1.9.

Part I. *of the Earth.*

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Day from the Commencement of the *Creation*; which *others* believ'd.

That *they* were not left by the *Seas* being constrained to *withdraw* from off certain Tracts of *Land*, which lay till then at the *Bottom* of it, but being *raised* to an higher Pitch, so as to surmount the Level of the *Seas Surface*, they, by that Means, became *Islands* and *habitable*; the said Tracts being thus elevated by *Earthquakes*, or the like subterraneous Explosions; in such Manner as *Rhodes*, *Thera*, *Therasia*, and many other *Islands* were supposed to have been raised; which is the *Conjecture* of *others*.

5.

That *they* were not left by the *Sea's* changing its Place, receding from the *Parts* it *anciently* possess'd, and betaking it self to *new Quarters*; *this Change* being occasion'd by some accidental *Emotion* or *Transposition* of the common Center of Gravity in the *Terraqueous Globe*; and thereupon the *Fluids* of it, the *Sea*, and the rest, immediately *shifting* likewise, as being the more easily moveable Parts of the Mass, and coming to another *Equilibrium*,
that

6.

that they might thereby the better accommodate themselves to their *new Center*; as *others*.

7. That *they* were not left upon the *Sea's* being *protruded* forwards, and constrained to *fall off* from certain *Coasts*, which it formerly possessed, by the *Mud* or *Earth* which is discharged into it by *Rivers*; the said *Mud* being repos'd along the *Shores* near the *Ostia* of those *Rivers*, and by that Means making continual *Additions* to the *Land*, thereby *excluding* the *Sea*, dayly invading and *gaining* upon it, and preserving these *Shells* as *Trophies* and *Signs* of its *new Acquests* and *Encroachments*; which *Others* have imagined; they concluding that the Islands *Echinades*, the *Lower Egypt*, *Thessaly*, and many other *Countries*, were thus rais'd out of the *Mud* brought down by *Achelous*, the *Nile*, *Peneus*, and other *Rivers*.

8. Lastly. That *they* were not left by the *Sea's* continual *flitting* and *shifting* its *Chanel*; this *Progression* being occasion'd by the *Sea's* *wearing* and *gaining* upon one *Shore*, and flinging up *Mud*, and, together with it, these
Shells,

Shells, upon the *other*, or opposite *Coasts*, thereby making perpetual *Additions* unto them; which is the *Opinion* of *other Authors*.

These *Propositions* (which are no other than so many *Conjectures* drawn from the *Observations*) are, we see, all *Negative*; as being directed against the *Mistakes* of some who have formerly engag'd in this *Research*. The *Ways* they have taken to account for the *Conveyance* of these *Marine Bodies* to *Land*, are very many, as well as *different* from each other. For so *eager* and *sollicitous* hath the *inquisitive* and *better* Part of *Mankind* been to bring this Matter to a fair *Issue* and *Determination*, that no Stone hath been left unturned, no Way, whereby these Things could ever possibly have been brought forth of the *Sea*, but one or other of them hath pitch'd upon it. So that, by this *Refutation* of all these, I might prove my *own* (which is the only one remaining) by *Induction*; but this kind of *Proof* is not needfull, where more *cogent* and *positive Arguments* are not wanting.

And

And thus much of *this Part* I get over by the sole Guidance of my *Senses*. A *View* of the *present State* of these *Bodies* alone convinced me sufficiently that the *Means*, proposed by *these Authors*, were not the *true ones* : that they were both *level'd wide*, and fell all *short* of the *Mark*. Now tho' this was enough for my present Purpose ; and when I had evinc'd that, although such *Alterations*, as those which *these Gentlemen* suppose, *Transitions*, and *Migrations* of the *Center of Gravity* : *Elevations* of new *Islands* : whole *Countries* gain'd from the *Sea* : and other like *Changes*, had *actually* happen'd, yet these *Shells* could never possibly have been *reposit'd* thereby in the Manner we now find them ; I say, when I had proved *this*, I was not immediately concerned to inquire whether such *Alterations* had really ever happen'd or not. Yet, partly for a fuller and more effectual *Disproof* of the recited *Opinions* : and partly because I am more especially obliged by my *general Design* to look into all Pretences of *Changes* in the *Globe* we inhabit, and I saw
very

very well that scarce *any*, of all these alledged, had the least Countenance either from the *present Face* of the *Earth*, or any credible and authentick *Records* of the *ancient State* of it, I resolved to pursue this Matter somewhat *farther*, and to shew that, although there do indeed happen some *Alterations* in the *Globe*, yet they are very *slight* and almost *imperceptible* *, and such as tend rather to the *Benefit* and *Con-* * Confer
Part 5.
Conf. 1. &c.
servation of the *Earth* and its *Pro-*
ductions, than to the *Disorder* and *De-*
struction both of the *one* and the *other*, as all these *supposititious ones* most manifestly would do, were there really any such. But from clear and incontestible *Monuments of Antiquity* : from *History* and *Geography* : and from attentive *Consideration* of the *present State* of those *Countries* where these *Changes* were supposed to have been wrought, I prove that they are *imaginary* and *groundless*, and that *such* in earnest never happened ; but that the *Bounds of Sea and Land* have been more *fix'd* and *permanent* : and, in short, that the *Terraqueous Globe* is
to

to *this Day* nearly in the same *Condition* that the *Universal Deluge* left it; being also like to *continue* so till the *Time* of its final *Ruin* and *Dissolution*, preserved to the *same End* for which 'twas first *formed*, and by the *same Power* which hath *secur'd* it hitherto. But, with respect to my *present Design*, I more particularly make out,

That although *Rain-water* be indeed (as these *Writers* suppose) very plentifully *saturated* with *Terrestrial Matter*, and (as I shall make appear) that *peculiar Matter* out of which the *Bodies* of *Vegetables*, and consequently of *Animals*, are *formed*, *nourish'd*, and *augmented*, *Water* being the common *Vehicle* and *Distributor* of it to the *Parts* of those *Bodies*, and *all Water* (especially that of *Rain*) being, more or less, *stored* with this, it being *light* in comparison of the common *mineral earthy Matter*, and therefore easily assumed into *Water*, and *moved* along with it; yet that this *Matter* being all originally derived from the *Surface* of the *Earth*, either by the *Vapour* that continually *issues* out, and

and *ascends* from all Parts of it[†], ^{† Part 3.}
 or *wash'd* off by *Land-floods*, and ^{Sett. 1.}
 conveyed into *Rivers* and the *Sea*, ^{Conf. 8.}
 and thence *elevated* up, together
 with the *Vapour*, which, as the for-
 mer, constitutes the *Rain* that falls;
 I say, it being thus *originaly* all
rais'd from the *Earth*, when *restor'd*
back again thereunto, 'tis but where
 it was *before*, and does not *enlarge*
 the *Dimensions* of the *Globe*, or aug-
 ment the *Surface* of the *Earth*, and
 only lye idley and unserviceably
 there, but *Part* of it is *introduced*
 into the *Plants* which grow thereon,
 for their *Nutrition* and *Increment*,
 and the *rest*, which is superfluous,
 either *remounts* again, with the *asc-*
ending Vapour, as before, or is
wash'd down into *Rivers*, and trans-
 mitted into the *Sea*, and does not
 make any sensible *Addition* to the
Earth, whatever *Some* may have be-
 liev'd.

That the *Terrestrial Matter*, which
 is thus carry'd by *Rivers* down into
 the *Sea*, is *sustained* therein, partly
 by the greater *Crafftitude* and *Gravi-*
ty of the *Sea-water*: and partly by
 its constant *Agitation*, occasion'd by
 the *Tides*, and by its other *Motions*;
 and

and is not permitted to *sink* to the *Bottom*. Or, if any of it do, 'tis *rais'd* up again by the next *Storm* : and, being *supported* in the *Mafs* of *Water*, together with the rest, 'tis by *Degrees exhaled*, mounted up with the *Rain* that *rises* thence, and returned back again to the *Earth* in fruitful *Showers*. By this perpetual *Circulation* a great many Things in the *System* of *Nature* are transacted : and two main *Intentions* of *Providence* constantly promoted ; the one a *Dispensation* of *Water* promiscuously and indifferently to all *Parts* of the *Earth* ; this being the immediate *Agent* that both *bears* the *constituent Matter* to all formed *Bodies*, and, when brought to them, *insinuates* it in, and *distributes* it unto the several *Parts* of those *Bodies*, for their *Preservation* and *Growth* : the other, the keeping a just *Æquilibrium*, if I may so say, betwixt the *Sea* and *Land* ; the *Water*, that was raised out of the *Sea*, for a *Vehicle* to this *Matter*, being by this Means *refunded back* again into it, and the *Matter* it self restored to its original *Fund* and *Promptuary*,
the

Part I. *of the Earth.*

53

the *Earth* ; whereby each is *re-
strained*, and kept to due *Bounds* ;
so that the *Sea* may not *encroach*
upon the *Earth*, nor the *Earth* gain
Ground of the *Sea*. That there ne-
ver were any *Islands*, or other like
Parcels of *Land*, amassed or heap'd
up : nor any considerable *Inlarge-
ment*, or Addition of Earth made to
the *Continent*, by the *Mud* that is
carried down into the Sea by Rivers.
That although the *Ancients* were al-
most unanimously of Opinion that
those Parts, where *Egypt* now is,
were formerly *Sea* : and that a
very large Portion of *that Coun-
try* was *recent*, and form'd out of
the *Mud* discharg'd into the neigh-
bouring Sea by the *Nile*, yet this
Tract of Land had no such *Rise*,
but is as *old*, and of as long a Stand-
ing, as *any* upon all the whole Con-
tinent of *Africa* : and hath been in
much the *same natural Condition*,
that it is at *this Day*, ever since the
Time of the *Deluge* ; its *Shores* be-
ing neither *advanced* one jot further
into the *Sea* for this three or four
thousand Years, nor its *Surface*
raised by additional *Mud* deposited
E upon

upon it by the yearly *Inundations* of the *Nile*. That neither the *Palus Maotis*, nor the *Euxine*, nor any other *Seas*, fill up, or by Degrees grow *shallower*. That *Salmydeffus*, *Themiscyra*, *Sidene*, and the adjacent Countries, upon the Coasts of the *Euxine Sea*, were not formed out of the *Mud* brought down by the *Ister*, *Thermodon*, *Iris*, and the other Rivers which discharge themselves into that *Sea*. That *Theffaly* was not raised out of the *Mud* born down by the River *Peneus*: the Islands *Echinades*, or *Curzolari*, out of that brought by the River *Achelous*: *Cilicia*, by the River *Pyramus*: *Mysia*, *Lydia*, *Ionia*, and other Countryes of *Anatolia*, by the *Caicus*, *Hermus*, *Cayster*, and the other Rivers which pass through them. To be short, That no *Island* or *Country* in the *whole World* was ever raised by *this Means*, notwithstanding that very many *Authors*, and some of considerable *Note*, have believed that all the abovementioned *Countryes* were so raised. Nay, to so strange a Height of Extravagance do some, otherwise Learned and Curious Persons

sons run, when they indulge *Fancy* too far, and rely wholly upon *Probabilities* and *Conjectures*, there is hardly any one single *Island*, or *Country*, all round the *Globe*, that one *Writer* or other hath not thought to have been formed after this Manner, or, at least, some very large Part of it.

That there is no *authentick* Instance of any considerable *Tract* of *Land*, consisting, as *usual**, of *Strata*†, that was rais'd up from the *Bottom* of the *Sea* by an *Earthquake*, so as to become an *Island*, and be render'd *habitable*. That *Rhodus*, *Tbera*, *Therasia*, and several other *Islands*, which were supposed by the *Antients*, and, upon their *Authority*, by *later Authors*, to have been thus raised, had really no such *Original*: but have stood out above *Water* as long as the rest of their *Fellow Islands*, and stand now just as the *Universal Deluge* left them.

E 2

That

* *Conf. Part 2. Conf. 3. infra.*

† And not a confused Heap of *Cinders* thrown forth of some *Vulcano*, like that cast up, a few Years ago, in the Bay of *Santorini*; of which see my *Answer* to the learned *Camerarius*, Part. 2. Sect. 8. Of the *Origin* of the *Monte di Cinere* something is noted towards the End of the 2d Part of this Essay.

That as to that *Affection* of *Bodies* which is called their *Gravity*, it clearly surpasses all the *Powers* of meer *Nature*, and all the *Mechanism* of *Matter*. That as any one *Body*, or Part of *Matter*, cannot be the *Cause* of its own *Gravity*: so no more can it ever possibly be the *Cause* of the *Gravity* of another *Body*, or Part of *Matter*. That neither the *Earth's* diurnal *Revolution* upon its *Axis*: nor any *magnetick Effluvia* of the *Earth*: nor the *Air*, or *Atmosphere* which environs the *Earth*: nor the *Æther*, or *Materia subtilis* of the *Cartesians*, in what Manner soever moved or agitated: (all which have been proposed by several *Learned Men* as the *Causes* of *Gravity*) nor any other *Fluid* or *Matter* whatever, can of it self produce such an *Effect* as is that of the *Gravity* of *Bodies*. That it does not proceed from the *Efficiency* of any such *contingent* and *unstable Agents*, but stands on a *Basis* more *firm* and *stedfast*; being entirely owing to the direct *Concourse* of the *Power* of the *Author of Nature*, immediately in his *Hand*, and the main
Engine

Part I. of the Earth.

37

Engine whereby this stupendous *Fabric* of the *Universe* is managed and supported: the *prime Hinge* whereon the whole *Frame* of *Nature* moves: and is principally concerned, if not the sole *Efficient* in the most remarkable *Phænomena* of the *Natural World*; which, should *Gravity* once cease, or be withdrawn, would instantly shiver into Millions of *Atoms*, and fall into the greatest *Disorder* and *Confusion*. That the common *Centre* of *Gravity* in the *Terraqueous Globe* is steady, immoveable, and not liable to any accidental *Transposition*: nor hath it ever shifted or changed its *Station*. And that there is no *Declination* of *Latitude*: nor *Variation* of the *Elevation* of the *Pole*; notwithstanding what some learned *Men* have asserted.

What concerns the raising of new *Mountains*: *Deterrations*, or the *Devolution* of *Earth* down upon the *Valleys*, from the *Hills* and higher *Grounds*: and *Islands* torn off from the main *Continent* by *Earthquakes*, or by the furious and impetuous *Insults* of the *Sea*; these, I say, will fall more properly under our

* Part 2.
and
Part 5.

Consideration on another Occasion*. And for the *Mutations* of lesser moment, which some have fancied to have happen'd within this *Intervall*, I mean, for the last four thousand Years since the Deluge, I chuse rather to pass them over at present, than to crowd and encumber this *short Tract* with the Account of them.

I must needs freely own, that when I first directed my Thoughts *this Way*, 'twas Matter of real Admiration to me, to find that a Belief of *so many* and *so great Alterations* in the *Earth*, had gained so large Footing, and made good its Ground *so many Ages* in the *World*; there being not the least *Signs* nor *Footsteps* of any such Thing upon the Face of the *whole Earth* ∴ no tolerable *Foundation* for such a Belief either in *Nature*, or *History*. But I soon saw very well, that the *Moderns* generally entertain'd it merely upon the Credit and Tradition of the *Ancients*, and *that* without due Examination, or Enquiry into the *Truth* and *Probability* of it. And 'twas not long e'er I discovered what
it

it was that did so generally *mislead* the *Ancients* into these *Mistakes*. But of that more by and by.

Those *ancient Pagan Writers* were indeed very much *excusable* as to this Matter. *Philosophy* was then again in its *Infancy*; there remaining but few Marks of the old *Tradition*, and those much obliterated and defaced by *Time*. So that *they* had only dark and faint *Idea's*, narrow and scanty Conceptions of *Providence*: and were ignorant of its *Intentions*, and of the *Methods* of its *Conduct* in the Government and Preservation of the *Natural World*. They wanted a longer *Experience* of *these Things*: a larger Stock of *Observations*, and *Records* of the *State* of the *Earth* before their *Times*; having, as Things then stood, nothing to assist them in their *Enquiries* besides their own *Guesses* and *Fancy*. For their *Progenitors*, and those who lived in the *earlier Ages*, were almost entirely taken up with *Business* of another Kind. That fatal Calamity, the *Deluge*, had wrought such a *Change**, that they

* Confer
Part 2.

beheld every where a *new Face* of

E 4

Things:

Things : and the *Earth* did not *then* teem forth its *Encrease*, as *formerly*, of its *own Accord*, but required *Culture*, and the *Assistance* of their *Hands*, much more than before it did. The Provision of Bread for *Food* : *Clothing* to ward off the *Injury* and *Inclemency* of the *Air* : and other like *Employs* for the *Comfort* and *Support* of *Life*, being of indispensable Necessity, were to be first look'd after. And these *Employs*, being then for the most part *new* to them, and such as they were *unskill'd* in, were alone enough to take up the greatest part of their *Time*. The *Methods* they used of *Agriculture*, and other *Arts* of like Importance, were so awkward and tedious, as to afford them little *Leisure* for *Works* of the *Brain*, for *History*, or *Contemplations* of that *Nature*. And till better *Experience* had led their *Posterity* to the *Improvements* of *Arts* : till the *Plow*, and other useful *Instruments*, were found out : and they had learn'd more compendious and expeditious *Ways* of dispatching those *Affairs*, whereby they *shortned* their *Labours*,
and

and so *gained Time*, there was no *Shew* of *Learning*, or Matters of Speculation among them; and we hear little or nothing of *Writing*; nay 'twas a very considerable Time before *Letters* themselves were found out. I know very well, there are some who talk of *Letters* before the *Deluge*; but that is a Matter of meer *Conjecture*, and I think nothing can be peremptorily determined either the one Way or the other; though I shall shew, that 'tis highly *probable* they had *none*. Be that how it will, I shall plainly make out, that the *Ages* which next succeeded the *Deluge* had *none*. Indeed they knew nothing at all of them: and the *first Writing* they used was only the simple *Pictures*, and *Gravings* of the *Things* they would *represent*, Beasts, Birds, and the like; which Way of Expression was afterwards call'd *Hieroglyphick*. But *this* fell into *disuse*, when *Letters* were afterwards *discover'd*; they being, in all Respects, a far more *excellent* and usefull *Invention*. We see therefore that there were several *Reasons* why those *early Ages*

ges could not transmitt Accounts of the *State* of the *Earth*, and of these *Marine Bodies*, in their *Times*, down to the *succeeding Generations*. So that *these* having little more to trust to than their *own Imagination*, and no surer a *Guide*, in their *Reasonings* about *these Things*, than *bare Conjecture*, 'twas no Wonder that they fell into gross and palpable *Mistakes* concerning them.

Nor much more Wonder is it that *Epicurus*, who could ever espouse a *Notion* so enormously absurd, and groundless, as that the World was framed by *Chance*: that this vast, regular, and most stupendous *Pile* was owing to no higher a *Principle* than a *fortuitous Congress of Atoms*: and that either there was no *God* at all, or, which is much the same Thing, that he was an impotent and lazy *Being*, and wholly without *Concern* for the *Affairs* of this *lower World*; I say, 'tis in no wise strange that such a One should believe, as he did, that *Things* were blindly shuffled and hurled about in the *World*: that the *Elements* were at constant *Strife* and *War* with each

each other : that, in some Places, the *Sea* invaded the *Land* : in others, the *Land* got Ground of the *Sea* : that *all Nature* was in an *Hurry* and *Tumult* : and that as the *World* was first *made*, so should it be again *dissolved* and *destroyed* by *Chance* : that it had already made large *Advances* that Way, being *infirm* and *worn* with *Age*, shatter'd and *crazy*, and would in Time dwindle and relapse again into its suppos'd original *Chaos*.

Did *Gravity*, the Inclination of *Bodies* towards a *Center*, to which Inclination they owe their respective *Order*, and *Site* in regard of each other, very many of their *Motions* and *Actions*, and in a great measure, their present *Constitution* ; did *this*, I say, happen from so contingent, precarious, and inconstant *Causes* as many have believ'd : or did it stand upon so ticklish and tottering a *Foundation* as some Mens Fancy hath placed it, 'twould be no Wonder should it frequently *vary* : its *Center* swerve and *shift*, upon every turn : and that there should ensue thereupon, not only such *Motions*, and *Alterations* of the
Bounds

Bounds of the Sea as they imagine ; but likewise many other, and not less pernicious Perturbations of the Course of even universal Nature.

Or was the *Universe* left to its own *Conduct* and *Management* : the whole *Mass* of created *Matter* to its proper *Disposition* and *Tendency* : were there no *Restraint* of *Bounds* to the *Earth*, nor *Curb* to the *Ocean* : was there not *One* who had *set Bars and Doors* to it, and said *hitherto shalt thou come, but no farther, and here shall thy proud Waves be staid** ; then indeed might we well expect such *Vicissitudes* and *Confusions* of Things ; such *Justlings* and *Clashings* in *Nature* : such *Depredations*, and *Changes* of *Sea* and *Land*.

* Job
xxxviii.
10, 11.

But if the same mighty *Power*, which in the *Beginning* produced this vast *System* of *Bodies* out of *Nothing*, and disposed and ranged them into the most excellent and beautiful *Order* we now behold : which at first framed an *Earth* of a *Constitution* suitable to the *innocent State* of its *primitive Inhabitants* : and afterwards, when *Man* had *degenerated*, and quitted that *Innocence*,
alter'd

alter'd that *Constitution* of the *Earth*, by means of the *Deluge* †, and re-duced it to the *Condition* 'tis now in, thereby adapting it more nearly to the *present Exigencies* of Things, to the *laps'd* and *frail State* of *humane Nature* : If that same *Power* be yet at the *Helm* : if it *preside* in the *Government* of the *Natural World* : and hath still the same peculiar *Care* of *Mankind*, and, for *their Sake*, of the *Earth*, as heretofore, (all which shall be evidently made out,) then may we very reasonably conclude 'twill also *continue* to *preserve* this *Earth*, to be a convenient *Habitation* for the *future Races* of *Mankind*, and to furnish forth all Things necessary for their *Use*, *Animals*, *Vegetables*, and *Minerals*, as long as *Mankind* it self shall endure ; that is, till the *Design* and *Reason* of its *Preservation* shall cease. And till then, so *steady* are the *Purposes* of *Almighty Wisdom* : so firm, establish'd, and constant the *Laws*, whereby it *supports* and *rules* the *Universe* ; the *Earth*, *Sea*, and all *natural Things* will continue in the *State* wherein they now are, without the least
Senescence

Senescence or *Decay*: without *Jarring*, *Disorder*, or *Invasion* of one another: without *Inversion* or *Variation* of the ordinary *Periods*, *Revolutions*, and *Successions* of Things: and we have the highest *Security* imaginable, that *While the Earth remaineth, Seed-time and Harvest, and Cold and Heat, and Summer and Winter, and Day and Night, shall not cease**.

* Gen.
viii. 22.

And whatever may be urged in *Behalf* of the *Ancients*, I cannot well see, I confess, what can be said for the *later Authors*, who have embrac'd the *same Tenets*, more than that these *Learned Men* took up those *Tenets on Trust*; their overgreat *Deference* to the *Dictates of Antiquity* betraying them into a *Persuasion* of such *Changes* in the *Earth*. I have given my *Reasons* above why I cannot think the *Antients* competent *Judges* in this *Case*. We have, at this time of *Day*, better and more certain *Means* of *Information* than *they* had: and therefore it were to have been wish'd that these *Gentlemen* had not thus obsequiously followed *them*, but gone another *Way* to work. It would certainly have

have been much better, had they taken the Pains to have look'd a little into *Matter of Fact* : had they consulted *History* and *Geography*, in order duly to acquaint themselves with the *past* and *present State* of the *terraqueous Globe* : and not to have pass'd *Sentence* till they had first compared the most *antient Descriptions* of *Countries* with the *Countries themselves* as *now* they stand. Nay, had they but read and attended to the *Accounts* which the very *Authors*, from whom they borrow these *Opinions*, have left us, they might have discover'd, even from *them*, the *Errors* and *Oversights* of their *Authors* : and have learned, that the *Face* of *Sea* and *Land* is the very *same* at *this Day* that it was when those *Accounts* were compil'd : and that the *Globe* hath not sustain'd any considerable *Alterations*, either in the *Whole*, or any of its *Parts*, in all this time.

Those who can content themselves with a *Superficial View* of *Things* : who are satisfy'd with contemplating them in *Gross* : and can acquiesce in a general, and less nice *Examination*

mination of them : whose *Thoughts* are *narrow* and *bounded* : and their *Prospects* of *Nature* scanty, and by *Piecemeal*, must needs make very *short* and defective *Judgements*, and, oftentimes very *erroneous*, and wide of *Truth*. Some fancyful Men have expected nothing but *Confusion* and *Ruin* from *those very Means* whereby both *that* and *this* is most effectually *prevented* and *avoided*. One imagines that the *terrestrial Matter*, which is showred down along with *Rain*, enlarges the *Bulk* of the *Earth*, and that it will in *Time* *bury*, and lay all *Things* *under Ground*. Another, on the contrary, fancies that the *Earth* will e'er long all be *wash'd away* by *Rains*, and born down into the *Sea* by *Rivers* : and, its *Chanel* being thereby quite *filled* up, the *Waters* of the *Ocean* will be turned forth to *overwhelm* the *dry Land*. Whereas by this *Distribution* of *Matter*, continual *Provision* is every where made for the *Supply* of *Bodies* : the just *State* of *Sea* and *Land* preserved, and the *Bounds* of each secur'd ; quite contrary to the preposterous *Reasonings* of those Men,
who

who expected so different a *Result* of these Things. And should this *Circulation*, from which they dreaded those dismal *Consequences*, once cease, the *Formation* of *Bodies* would be immediately at an *End*: and *Nature* at a perfect *Stand*. But I am aware that I transgress: and that this is a *Prolixity* not allowable in a *Treatise* of this Nature; wherefore I shall conclude, after I have performed my *Promise* of discovering what it was which led the *ancient Historians*, *Geographers*, and Others so generally into a Belief of these frequent *Changes* betwixt *Sea* and *Land*: and 'twas *this*.

They observed, almost wherever they cast their Eyes, vast *Multitudes* of *Sea-shells*, at *Land*, in their *Fields*, and even at very great *Distance* from any *Sea*. This, *Eratasthenes*, *Herodotus*, *Xanthus Lydus*, *Strabo*, *Pausanias*, *Pomponius Mela*, *Theophrastus*, *Strato* the Philosopher, *Plutarch*, and others of them assure us. They found them upon the *Hills*, as well as in the *Valleys*, and *Plains*: they observed that they were immersed in the *Mass* of the *Stone* of their

F

Rocks,

The Natural History Part I.

Rocks, Quarries, and Mines, in the same Manner as they are at this Day found in all known Parts of the World.

Nay, in those *Elder Times*, and which were so much nearer to the *Deluge* than ours are, they found these *Marine Bodies* more frequently, and in much greater Plenty, than we now do: and most, if not all of them, *fresh, intire, and firm*. The whole *crustaceous Kind*, and the *lighter ones* of the *testaceous*, which together would be a *vast Number*, subsiding last, fell upon the *Surface* of the *Earth* *; whilst the *heavier*, which settled down before, were entombed in the *Bowels* of it. Those therefore must then lye every where strew'd upon the *Ground*. Whereas now very few, if any, of them appear †; the *Shells* which we find at present upon the *Face* of the *Earth* being principally of the *heavier Sorts*, which were at first lodged within it, and since disclosed and turned out; by what Means we shall see hereafter ||. And indeed, 'tis not conceivable how the Generality of them could endure so many Hun-

* *Pag.* 30,
§ *seqq.*
 and *Pt.* 2.
Conf. 3.

† *Conf.*
p. 3† and
Part. 2.
Conf. 3.

|| *Part.* 5.
Conf. 4.

Part I: of the Earth.

71

Hundreds of Years as have since past : how they could lye so long exposed to the *Air, Weather*, and other *Injuries*, without vast Numbers of them, and especialy the finer and tenderer Species, being, long e'er this, *perish'd* and *rotten* : some of them quite *destroy'd* and *vanish'd*, and the rest so *damag'd*, many of them, and *alter'd* by *Time*, as not to appear the Things they then were, and so create a Doubt amongst some of *us* whether they are realy *Shells* or not.

This was a *Scruple* that never enter'd into *their Heads*. The *Shells*, being then fair, *sound*, and free from *Decay*, were so exactly *like* those they saw lying upon their *Shores*, that they never made any *Question* but that they were the *Exuvia* of *Shell-fish* : and that they once belonged all to the *Sea*. But the *Difficulty* was how they came *thither* : and by what Means they could ever arrive to *Places* oftentimes *To remote* from the *Ocean*.

The *Ages* that went *before* knew well enough how these *Marine Bodies* were brought *thither*. But such

were the *Anxieties* and *Distresses* of the then again *infant World* : so incessant their *Employs* about Provision for *Food*, *Rayment*, and the like, that (even after *Letters* were discover'd) there was little *Leisure* to committ any thing to *Writing* : and, for want *thereof*, the *Memory* of this extraordinary *Accident* was in great Measure *worn out* and *lost*. 'Tis true there was a general and loud *Rumour* amongst them of a mighty *Deluge* of Water that had drown'd all *Mankind*, except only a very few *Persons*. But there had also happen'd very terrible *Inundations* of later *Date*, and which were nearer to the *Times* when these *Authors* lived. Such was that which overflow'd *Attica* in the Days of *Ogyges* : and that which drowned *Thessaly* in *Deucalion's* Time. These made cruel *Havock* and *Devastation* amongst them : their own native Country, *Greece*, was the *Theatre* whereon these *Tragedies* were acted, and their *Progenitors* had seen and felt their *Fury*. And these happening nearer Home, and their *Effects* being fresh, and in all Mens Mouths, they made

so

so sensible and lasting *Impressions* upon their *Minds*, that the old great *Deluge* was eclipsed by that Means, its *Tradition* mightily obscured, and the *Circumstances* of it so interwoven and confounded with those of these *late Deluges*, that 'twas e'en dwindled into *Nothing*, and almost bury'd in the *Relations* of *those Inundations*.

In *their Inquiries* therefore into this *Matter*, scarcely a Man of them thought, or so much as dream'd of the *Universal Deluge*. They concluded indeed unanimously that the *Sea* had been *there*, wherever they met with any of these *Shells* : and that *it* had left them behind. And so far they were in the *right* : *this* was an *Inference* rational and natural enough. But when they began to reason about the *Means* how the *Sea* got thither, and away back again, *there* they were perfectly in the Dark. And, both *Tradition* and *Philosophy* failing them, they had recourse to *Shifts*, and to the best *Conjectures* they could think of ; concluding that *it* was either forced forth, as in *particular Inundations*, such as those lately men-

tion'd: or that *those Parts*, where they found the *Shells*, had been *formerly* in the *Possession* of the *Sea*, and the *Place* of its natural *Residence*, which it had since quitted and *deserted*.

Upon *this* they began to seek out by what *Means*, most probably, the *Sea* might have been *dispossess'd* of those *Parts*, and constrained to move into *other Quarters*. And, if 'twas an *Island* where they found the *Shells*, they *straightways* concluded that the *whole Island* lay *originally* at the *Bottom* of the *Sea*: and that 'twas either hoisted up by some *Vapour* from beneath: or that the *Water* of the *Sea*, which *formerly* cover'd it, was in Time *exhaled*, and *dried* up by the *Sun*, the *Land* there by laid *bare*, and these *Shells* brought to *Light*. But if 'twas in any *Part* of the *Continent* where they found the *Shells*, they concluded that the *Sea* had been *extruded* and *driven off* by the *Mud* that was continually brought down by the *Rivers* of those *Parts*.

That I may not be over-tedious here, I will only add, that I shall clearly

Part I. *of the Earth:*

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clearly shew, from plain *Passages* of their own *Writings*, yet extant, that 'twas meerly the finding these *Sea-Shells* at *Land* that occasioned this Stir, and raised all this Dust amongst the *Ancients*: and upon which principally they grounded their *Belief* of the *Vicissitudes* and *Changes* of *Sea* and *Land*, wherewith their *Writings* are so filled. But how little Reason they had for it: and how far *those* have been over-seen who have followed them herein, hath been intimated already, and will appear farther from the following *Part* of this *Essay*, to the Account of which I now hasten.



F 4


PART



PART II.



Concerning the Universal Deluge. That these Marine Bodyes were then left at Land. The Effects it had upon the Earth.

 HE *Confectaryes* of the former Part of this Discourse are all negative; that being only introductory, and serving but to free the Way to this second Part: to rescue the Enquiry from the Perplexities that some Undertakers have incumber'd it withall; and to set aside the false Lights they used in Quest of the Agent which transposed these Sea-shells to Land.

Now

Now the only *sure Lights* we have to conduct us, in the *Ascertaining* this *Affair*, are *History of Fact, and Observations*. So that I shall give here some *Intimation* of the *Chief* of *those* that serve to clear up *this Subject*, and bring the *Thing* in *Question* to a fair *Decision*. These are, That the *Earth*, all round the *Globe*, appears, wherever it is laid open, to be *wholey compos'd of Strata*, lying on each other, in *Form* of so many *Sediments*, fall'n down, successively, from *Water*. That, accordingly, those *Strata* that ly *deepest*, are ordinarily the *thickest*: and those that ly *above*, gradually *thinner*, quite up to the *Surface*. That there are *Sea-shells*, and *Teeth* and *Bones of Fishes*, found *repositied* in these several *Strata*; not only in the more lax, *Chalk*, *Clay*, and *Marle*, but even in the most solid, *Stone*, and the rest. That these *marine Bodyes* are *incorporated* with the *Sand* that constitutes the *Stone* of these *Strata*, in such sort as together to *compose one common Mass*. That on *Breaking up* this *Mass*, so as to part the *Shell* from the *Stone*, *this* is ever observ'd
to

to have receiv'd an *Impression*, of the *exteriour Surface* of the *Shell*, so exact as to shew it had been *contiguous* and *apply'd* to all *Parts* of the *Shell*; which the *Stone* could not have been capable of, had it not been then in a *State of Solution*, the *Matter* whereof it consists *loose*, and susceptible of *Impression*. That, upon Breaking the *Shells*, and examining the *Insides* of them, they are found to contain in them *Stone*, commonly of the same Kind with that without, which the *Stratum* is made up of: and *apply'd* as exactly to the *Insides* of the *Shells*; so as to have taken the *Impression* and all the *Lineaments* of them, after the Manner of *Matter* cast, soft, or melted, in a *Mould*. That the *Shells* are, as frequently, *immers'd* in the *Substance* of the *Mineral*, and *Metallic Nodules*, even the most firm and solid, *Flint*, *Spar*, *Pyrita*, and the rest; the *Matter* of these *Nodules* exhibiting the *Lineaments* and *Impressions* of both the *Outsides* and *Insides* of the *Shells*, as truly as the *Stoney Matter* of the *Strata* does. That these *Marine Productions* are thus *reposit*ed as well
in

in the *lowest Strata*, as in the *uppermost* : at the *Bottoms* of the *deepest Mines*, as to the very *Tops* of the *biggest Mountains*. That they are observ'd in some Places in such *Multitudes* as, in Bulk, and Quantity, to *equal* if not *exceed* the *Sand*, or other *terrestrial Matter* of the *Strata*. That there are ordinarily dig'd up, amongst the rest, *Shells* that are of *foreign Origin* and *Extrac*; being not the *Product* of the *Neighbouring Seas*, but of *Seas* much *remote* and at great *Distance*. Thus we here in *England* discover, frequently at great *Depths*, *Shells* of *Fish*, very numerous, and of different *Kinds*, that appear now *liveing* only on the *Coasts* of *Peru*, and other *Parts* of *America*. That there are likewise *discover'd*, commonly, at *Land*, and in the *Bowels* of the *Earth*, *Shells* that are not at this *Day* found *liveing* on any *Coasts*; being doubtless such as naturally reside and inhabit only in the *deepest* and most remote *Recesses* of the *Main Ocean*, without ever now approaching near any *Shore*, or being consequently ever seen*. That, in

* Confer
Pag. 27, &
all 28. *supra*.

all Parts of the Earth, as well in Asia, Africa, and America, as in Europe, as well in Countreys the most Distant from any Seas, as those that by nearer to them, the Strata are compil'd, and the Marine Bodies dispos'd in them, every where after the very same Method : and so as apparently to shew Things were reduced into this Method, in all Countreys, at the same Time, and by the same Means. That there are also lodg'd in the Strata, Bones, Teeth, and other Parts, of Quadrupedes, or Land-Animals, and oftentimes of such as are not Natives of the Country in which they are thus found. Particularly here in England we dig up the Tusks, and the Grinder-Teeth, the Bones, yea whole Skeletons, of very great Elephants : and likewise incredibly large Horns of the Moose Deer, a Creature not known to be now liveing in any other Country excepting America. That there are, besides, repositied in Stone, and even in the firmest and hardest Strata, Leaves of various Kinds of Vegetables : and sometimes whole Trees : as also such Fruits as are dureable, firm,

firm, and capable of being preserv'd, *e. gr. Nuts, Pine-Cones*, and the like. That, amongst the rest, there are discover'd, under ground, *Trees, Leaves, and Fruits, of Vegetables*, in *Countrys* where such do not now spontaneously grow. Nay that there are dig'd up *Trees*, in great *Numbers*, and many of them very large, in some *Northern Islands*, in which there are at this Day growing no *Trees* at all: and where, by reason of the great *Bleakness* and *Cold* of those *Countrys*, 'tis probable none ever did or could grow. That, of all the various *Leaves*, which I have yet seen, thus lodg'd in *Stone*, I have observ'd none in any other State, nor *Fruits* further advanc'd in *Growth*, and towards *Maturity*, than they are wont to be at the latter End of the *Spring Season**. That the squamose *Covers* of the *Germina* or *Buds*, and the *Shiv's* or *Chaff* of the *Juli* of *Trees* and *Sbrubs*, that fall off in the Spring,

* *When*, according to the *Mosaic Relation*, the *Water* of the *Deluge* came forth, and put a *Stop* to the *Growth* of both *Animals* and *Vegetables*. *Confer* *Part 3. Sect. 2. Conf. 3. and Part 6. towards the End.*

Spring, and are found in so vast Quantityes in many Peat Marshes, apparently point forth the *same Season*. And likewise the immense Shoals of the *Ova* of *Fishes*, so frequent in the upper *Strata* of *Stones*. That the *Shells* of the *Tounge* of *Fish* of the *current Year*, whatever dig'd up, are of the *Size* and *Bigness* they are used to arrive to at *that Season*. That of all the many *Flyes*, and *Insects*, that I have yet seen inclos'd in *Amber**, I have never observ'd any that were not of the *vernal Tribes* and *Kinds*.

These are the main *Observations* whereon I found what I shall offer. Nor is any Thing further needful than a right *Attention* to these, to discern clearly that the *Methods*, set forth in the *precedent Part*, fall far short of *solveing* the *Phænomena* here recounted: and that *Observation* of the *present State* of the *Earth*, and of the *Site* and *Condition* of the *marine Bodies* in it, is, alone, sufficient to demonstrate that they could
not

* A Sort of Bituminous Nodule, form'd, with the rest, during the Deluge, *Vid. Part IV. infra*, near the End.

not possibly be reposed, in *that Manner*, by *particular Inundations*: by the *Sea's receding* and *shifting* from Place to Place: nor by any of the *other Means* there pretended.

I pass therefore next on to search out the *true Means*: to discover the *Agent* that did actually bring them forth, and dispose them into the *Method* and *Order* wherein we now find them. To which Purpose Nothing is requisite, more, than to have Recourse to still the same *Observations*. For, by their sole Assistance, this Matter may be rightly and fully adjusted. So that I shall only proceed to make *Inferences* from them; which *Inferences*, in *this Part*, are all *affirmative*. Of these, the first is,

That these *Marine Bodies* were born forth* of the *Sea* by the *Universal Deluge*: and that, upon the *Return* of the *Water* back again from off the *Earth*, they were left behind at *Land*.

I.
* Confer.
Part 3.
Sect. 2.
Conf. 2, 3.

As this is a *Proposition* of great *Weight* and *Consequence*, I shall be very carefull and particular in the *Establishment* of it; conferring every
Circumstance

Circumstances of these *Marine Bodies*, to see how they square with it : and shall not dismiss it till I have evinced that *those* which I prest, in the *precedent Part*, as *Objections* against the *several Ways* there propounded, all fall in here, and are the clearest and most convincing *Arguments* of the *Truth* hereof : that *this*, and *this alone*, does naturally and easily account for all those *Circumstances* : and fairly takes off all *Difficulties*.

Which being dispatch'd, I return back to my *Observations* : and proceed upon *them* to represent the *Effects* that the *Deluge* had upon the *Earth*, and the *Alterations* that it wrought in the *Globe* ; some whereof were indeed very *extraordinary*. Of which yet we have a plain and undeniable *Certainty* ; the Evidences of them flowing directly and immediately from the *Observations* : and being withal so full and clear that 'tis impossible these *Marine Bodies* could have been any ways lodg'd in such *Manner*, and to so great *Depths*, in the *Beds* of *Stone*, *Marble*, *Chalk*, and the rest, had not *these*

these Alterations all really happen'd.
Namely,

2. That during the Time of the Deluge, whilst the Water was out upon, and covered the Terrestrial Globe, all the Stone and Marble of the Antediluvian Earth: all the Metalls of it: all Mineral Concretions: and, in a Word, all Fossils whatever, that had before obtain'd any Solidity, were totally dissolved, and their constituent Corpustcles all disjoyned, their Cohasion perfectly ceasing. That the said Corpustcles of these solid Fossils, together with the Corpustcles of those which were not before solid, such as Sand, Earth, and the like: as also all Animal Bodies, and Parts of Animals, Bones, Teeth, Shells: Vegetables, and Parts of Vegetables, Trees, Shrubs, Herbs: and, to be short, all Bodies whatsoever that were either upon the Earth, or that constituted the Mass of it, if not quite down to the Abyss*, yet at least to the greatest Depth we ever dig; I say all these were assumed up promiscuously into the Water, and sustained in it, in such Manner that the Water, and Bodies in it, together,

* Vid.
Part 3.
Sect. 1.
Confest. 1.

made up one common *confused Mass*.

3.

That at length all the *Mass*, that was thus *born* up in the *Water*, was again *precipitated*, and *subsided* towards the Bottom. That this *Subsidence* happened generally, and as near as possibly could be expected in so great a *Confusion*, according to the *Laws of Gravity* *; that Matter, Body, or Bodies, which had the *greatest Quantity or Degree of Gravity*, subsiding *first* in Order, and falling *lowest*: that which had the next, or a *still lesser Degree of Gravity*, subsiding *next* after, and *settling upon* the *Precedent*: and so on, in their *several Courses*; that which had the *least Gravity* sinking not down till *last of all*, settling at the *Surface* of the *Sediment*, and, *covering* all the rest. That the *Matter*, subsiding thus, *formed* the *Strata* of *Stone*, of *Marble*, of *Coal*, of *Earth*, and the rest; of which *Strata*, lying one upon another, the *Terrestrial Globe*, or at least as much of it as is ever displayed to view, doth mainly consist. That the *Strata* being arranged in *this Order* meely
by

* Confer
p. 3.

- by the *Disparity* of the *Matter*, of which each consisted, as to *Gravity*, that *Matter* which was *heaviest* descending *first*, and all that had the *same Degree* of *Gravity* subsiding at the *same Time* : and there being
- *Bodies* of quite *different Kinds*, *Natures*, and *Constitutions*, that are nearly of the *same Specifick Gravity*, it thence happened that *Bodies* of quite *different Kinds* subsided at the *same Instant*, fell together into, and
 - composed the *same Stratum*. That for this Reason the *Shells* of those *Cockles*, *Escalops*, *Perewinkles*, and
 - the rest, which have a *greater Degree* of *Gravity*, were enclos'd and lodg'd in the *Strata* of *Stone*, *Marble*, and the *heavier Kinds* of *Terrestrial Matter* ; the *lighter Shells* not sinking down till *afterwards*, and so falling amongst the *lighter Matter*, such as *Chalk*, and the like, in all such *Parts* of the *Mafs* where there happened to be any considerable Quantity of *Chalk*, or other *Matter lighter* than *Stone* ; but where there was *none*, the said *Shells* fell upon, or near unto, the *Surface*. And accordingly we now find the
- G 2 lighter

lighter Kinds of Shells, such as those of the Echini, and the like, very plentyfully in Chalk, but of the heavier Kinds scarcely one ever appears; these subsiding sooner, and so settling deeper, and beneath the Strata of Chalk. That Humane Bodies, the Bodies of Quadrupeds, and other Land-Animals, of Birds, of Fishes, both of the Cartilaginous, Squamose, and Crustaceous Kinds: the Bones, Teeth, Horns, and other Parts of Beasts, and of Fishes: the Shells of Land-Snails: and the Shells of those River and Sea Shell-fish that were lighter than Chalk, &c: as also Trees, Shrubs, and all other Vegetables, and the Seeds of them: and that peculiar Terrestrial Matter whereof these consist, and out of which they are all formed; I say all these (except some Mineral or Metallick Matter happened to have been affixed to any of them, whilst they were sustained together in the Water, so as to augment the Weight of them) being, Bulk for Bulk, lighter than Sand, Marl, Chalk, or the other ordinary Matter of the Globe, were not precipitated till the last, and so lay*

*As Pt. 4.
Consect. 2.

lay *above* all the former, constituting the *supreme* or *outmost Stratum* of the *Globe*. That *these* being thus lodged *upon* the *rest*, and consequently more nearly *exposed* to the *Air, Weather*, and other *Injuries*, the *Bodies* of the *Animals* would suddenly *corrupt* and *rot*: the *Bones, Teeth*, and *Shells*, would likewise all *rot* in time, except those which were secured by the extraordinary *Strength* and *Firmness* of their *Parts*, or which happened to be *lodged* in such *Places* where there was great *Plenty* of *bituminous* or other like *Matter* to *preserve*, and, as it were, embalm them: that the *Trees* would in *Time* also *decay* and *rot*, unless such as chanced to be reposed in, and secured by the same *Kind* of *Matter*: that the other more tender *Vegetables, Shrubs*, and *Herbs*, would *rot* likewise and *decay*. But the *Seeds* of all *Kinds* of *Vegetables*, being by this *Means* repos'd, and, as it were, *planted* near the *Surface* of the *Earth*, in a convenient and *natural Soil*, amongst *Matter* proper for the *Formation* of *Vegetables*, would *germinate, grow up*, and replenish the

Face of the Earth: and that *vegetative Terrestrial Matter*, that fell, along with these, into this uppermost *Stratum*; and of which principally it *consists*, hath been ever since, and will continue to be, the standing *Fund* and *Promptuary* out of which is derived the *Matter* of all *Animal* and *Vegetable Bodies*, and whereinto, at the *Dissolution* of those *Bodies*, that *Matter* is restored back again successively for the *Constitution* and *Formation* of others*.

* *Vid.*
Part V.
Conf. 1.

4.

That the *Strata* of *Marble*, of *Stone*; and of all other *solid Matter*, attained their *Solidity*, as soon as the *Sand*, or other *Matter* whereof they consist, was arriv'd at the *Bottom*, and well settled there. And that all those *Strata* which are *solid* at *this Day*, have been so ever since that *Time*.

5.

That the said *Strata*, whether of *Stone*, of *Chalk*, of *Cole*, of *Earth*; or whatever other *Matter* they consisted of, lying thus each upon other, were all originally *parallel*: that they were *plain*, *even*, and *regular*: and the *Surface* of the *Earth* likewise *even* and *spherical*: that they were
continuous

Part I. of the Earth.

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continuous, and not interrupted, or broken : and the whole Mass of the Water lay then above them all, and constituted a fluid Sphere environing the whole Globe.

That, after some time, the Strata were broken, on all Sides of the Globe : that they were dislocated, and their Situation varied, being elevated in some Places, and depressed in others. 6.

That the Agent, or Force, which effected this Disruption, and Dislocation of the Strata, was seated within the Earth. 7.

That the Irregularities and Inequalities of the Terrestrial Globe were caused by this Means : date their Original from this Disruption, and are intirely owing unto it. That the natural Grotto's in Rocks, and those Intervalls of the Strata, which, in my Observations, I call the Perpendicular Fissures*, are nothing but these Interruptions or Breaches of the Strata. That the more eminent Parts of the Earth, Mountains and Rocks, are only the Elevations of the Strata ; these, wherever they were solid, rearing against and supporting each other. 8.

* Confer.
Pag. 11.
supra.

• Confer
Consect. 6.
supra.

other in the *Posture* whereinto they were put by the *Bursting* or *Breaking up* of the *Sphere* of *Earth* * : and *not falling* down again, nor returning to their former and more level *Site*, as did the *Strata* of *Earth*, and other *Matter* that was *not solid*, and had no *Strata* of *Stone*, or other *consistent Matter*, interpos'd, amongst their *Strata* underneath, to uphold them in the *Posture* they were then raised into. For which Reason 'tis, that *Countrys* which abound with *Stone*, *Marble*, or other *solid Matter*, are *uneaven* and *mountainous* : and that those which afford none of these, but consist of *Clay*, *Gravel*, and the like, without any *Stone* interposed, are more *champaign*, *plain*, and *level*. That the *lower Parts* of the *Earth*, *Vallyes*, the *Chanel* of the *Sea*, and the rest, are nothing but *Depressions* of the *Strata*. That *Islands* were form'd and distinguish'd by the *Depression* or *sinking down* of the *Strata* lying betwixt each of them, and betwixt them and the *Continent*. In one Word, that the *whole Terraqueous Globe* was, by *this Means*, at the *Time* of the *Deluge*,
put

put into the *Condition* that we now behold.

Here was, we see, a mighty *Revolution*: and *that* too attended with *Accidents* very strange and amazing: the most horrible and portentous *Catastrophe* that *Nature* ever yet saw: an elegant, orderly, and habitable *Earth* quite *unbinged*, shatter'd all to *Pieces*, and turned into an *Heap* of *Ruins*: *Convulsions* so *exorbitant* and unruly: a *Change* so exceeding great and violent, that the very *Representation* alone is enough to startle and shock a Man. In Truth the Thing, at first, appear'd so *wonderful* and *surprising* to me, that I must confess I was for some Time at a Stand. Nor could I bring over my *Reason* to assent, untill, by a deliberate and careful *Examination* of all *Circumstances* of these *Marine Bodies*, I was abundantly convinced that they could not have come into those *Circumstances* by any other *Means* than such a *Dissolution* of the *Earth*, and *Confusion* of *Things*. And were it not that the *Observations*, made in so *many*, and those so *distant Places*, and repeated so often

ten with the most scrupulous and diffident *Circumspection*, did so establish and ascertain the Thing, as not to leave any Room for *Contest* or *Doubt*, I could scarcely ever have credited it.

And though the whole *Series* of this extraordinary *Turn* may seem at first View to exhibit nothing but *Tumult* and *Disorder*: nothing but *Hurry*, *Jarring*, and *Distraction* of Things: though it may carry along with it some slight Shew that 'twas managed *blindly* and at *random*; yet if we draw somewhat nearer, and take a closer Prospect of it: if we look into its *retired Movements*, and more secret and latent *Springs*, we may there trace out a *steady Hand*; producing *Good* out of *Evil*: the most consummate and absolute *Order* and *Beauty*, out of the highest *Confusion* and *Deformity*: acting with the most exquisite *Contrivance* and *Wisdom*: attending vigilantly throughout the whole *Course* of this grand *Affair*, and directing all the several *Steps* and *Periods* of it to an *End*, and that a most noble and excellent one; no less than the *Happiness* of the whole

Part II. *of the Earth.*

95

whole Race of *Mankind*: the *Benefit*, and universal *Good*, of all the many *Generations* of *Men* which were to come after: which were to inhabit *this Earth*, thus *moduled anew*, thus suited to their *present Condition* and *Necessities*.

But the *Presidence* of that *mighty Power* in this *Revolution*: its particular *Agency* and *Concern* therein; and its *Purpose* and *Design* in the several *Accidents* of it, will more evidently appear, when I shall have proved,

That, altho' one *Intention* of the *Deluge* was to inflict a deserved *Punishment* upon *that Race* of *Men*, yet it was not *solely levell'd* against *Mankind*, but *principally* against the *Earth* that then was; with *Design* to *destroy* and *alter* that *Constitution* of it, which was apparently *calculated* and *contrived* for a *State of Innocence*: to fashion it afresh, and give it a *Constitution* more nearly accommodated to the *present Frailties* of its *Inhabitants*.

That the said *Earth*, though not indifferently and alike *fertil* in all *Parts* of it; was yet generally much
more

• Confer
pag. 13.
supra: and
Part V.
Confess. 1.

more fertile than ours is. That the
exteriour Stratum or *Surface** of it,
consisted entirely of a kind of *terre-*
strial Matter proper for the *Nourish-*
ment and *Formation* of *Plants*, and
this in great *Plenty* and *Purity*; be-
ing little, or not at all, entangled
with an *Intermixture* of meer *Min-*
eral Matter that was unfit for *Vege-*
tation. That its *Soil* was more

• Confer
Part 6.
Confess. 5.

luxuriant: and teemed forth its *Pro-*
ductions in far greater *Plenty* and *A-*
bundance than the *present Earth* does.*
That the *Plough* was *then* of no
Use, and not invented 'till *after* the
Deluge; that *Earth* requiring little
or no *Care* or *Culture*, but yielding
its Increase *freely*, and without any
considerable *Labour* and *Toil*, or As-
sistance of *Humane Industry*; by this
Means allowing *Mankind* that *Time*,
which must otherwise have been
spent in *Agriculture*, *Plowing*, *Sow-*
ing, and the like, to far more di-
vine and noble *Uses*: to *Purposes*
more agreeable to the *Design* of their
Creation; there being no Hazard,
whilst they continu'd in that *State*
of *Perfection*, of their *Abusing* this
Plenty, or *Perverting* it to any other
End

End than the *Sustenance* of Nature, and the necessary *Support* of Life.

That when *Man* was fallen, and had abandon'd his *primitive Innocence*, the *Case* was much alter'd: and a far *different Scene* of Things presented. That generous *Vertue*, masculine *Bravery*, and prudent *Circumspection* which he was before Master of, now deserted him, together with that *Innocence* which was the *Basis* and *Support* of all: and a strange *Imbecility* immediately seiz'd and laid hold of him. He became *pusillanimous*, and was easily ruffled with every little *Passion* within: supine, and as openly exposed to any *Temptation* or *Assault* from without. And now those *exuberant Productions* of the *Earth* became a continual *Decoy* and *Snare* unto him. They only excited and fomented his *Lusts*: and ministred plentyfull *Fewel* to his *Vices* and *Luxury*. And the *Earth* requiring little or no *Tillage*, there was little *Occasion* for *Labour*; so that almost his *whole Time* lay upon his *Hands*, and gave him *Liesure* to contrive, and full swing to pursue his *Follies*; by which

which Means he was laid open to all manner of *Pravity, Corruption, and Enormity*. So that we need not be much surprized to hear *That the Wickedness of Man was great in the Earth, and that every Imagination of the Thoughts of his Heart was only evil continually**: nor more, that that Generation of Men was more particularly addicted to *Intemperance, Sensuality, and Unchastity*: that they spent their Time in *Gluttony, in Eating and Drinking, in Lust and Wantonness*, or, as the sacred Writer cleanly and modestly expresses it, in *Marrying, and giving in Marriage**, and this without Discretion or Decency, without Regard to Age or Affinity, but promiscuously, and with no better a Guide than the Impulses of a brutal Appetite, *They took them Wives of all which they chose**; Plenty and Abundance, Idleness and Ease, so naturally cherishing and promoting those particular Vices. Nor lastly, is it strange that the *Apostacy* was so great, the *Infection* so universal: that the *Earth was filled with Violence*, and that all *Flesh had corrupted his Way**; the Cause

* Gen. vi. 5.

* Matth. xxiv, 38.

* Gen. vi. 2.

* Gen. vi. 11, 12.

Cause of this Corruption, the Fertility of that Earth, being so universal, so diffusive and epidemical. And indeed, 'twould be very hard to assign any other single Cause, besides this, that could ever possibly have had so spreading and general an Effect as this had. The Pravity of humane Nature is not, I fear, less than it was then : the Passions of Men are yet as exorbitant, and their Inclinations as vicious : Men have been wicked since the Deluge : they are so still : and will be so, but not universally. There are now Bounds set to the Contagion : and 'tis restrained by removing the main Cause of it. But there, the Venom manifested it self on all Hands : spread far and near, scarcely stopping 'till 'twas insinuated into the whole Mass of Mankind : and the World was little better than a common Fold of Pbreneeticks and Bedlams.

That to reclaim and retrieve the World out of this wretched and forlorn State, the common Father and Benefactor of Mankind seasonably interposed his Hand : and rescued miserable Man out of the gross Stupidity

pidity and Sensuality whereinto he was thus unfortunately plunged. And this was effected partly by tying up his Hands, and shortning the Power of Sinning: checking him, in the Career of his Follies, by Diseases and Pains: and setting Death, the King of Terrors, which before stood aloof off, and at the long Distance of eight or nine hundred Years, now much nearer to his View, ordaining that his Days shall be but an hundred and twenty Years†: and partly by Removing the Temptation, and Cause of the Sin: by Destroying* that Earth which had furnish'd forth Maintenance in such Store unto it: by changing that Constitution of it, and

† Gen.
vi. 3.

* Gen. vi. 13. And behold I will DESTROY them with THE EARTH. And again, at the Covenant made with Noah, after the Deluge, more distinctly, Gen. ix. 11. Neither shall all Flesh be cut off any more by the Waters of a Flood: neither shall there any more be A FLOOD TO DESTROY THE EARTH; the latter Part whereof is render'd somewhat more expressly by the Septuagint ἔτι οὐκ ἔσται καταστροφὴ ὕδατος καταβῆναι ΠΑΣΑΝ τὴν γῆν. i. e. And there shall not be any more a Deluge of Water to destroy the WHOLE EARTH. The vulg. Lat. hath it, Neque erit deinceps, Diluvium dissipans terram, i. e. Neither shall there be hereafter a Deluge to dissipate [or dissolve] the Earth. And of this Dissolution of the Earth there was a Tradition amongst the Antients, both Jews and Gentiles. Vid. Part. 3. infra, near the End.

and rendring it more *agreeable* to the *laps'd* and *frail State* of *Mankind*. That *this Change* was not wrought by altering either the *Form* of the *Earth*, or its *Position* in respect of the *Sun*, as was not long ago surmised by a *Learned Man**, but by *Dissolving* † it: by *Reducing* all the *Matter* of it to its *first constituent Principles*: by *Mingling*, and *Confound*ing them, the *Vegetative* with *mineral Matter*, and the *different Kinds* of *mineral Matter* with *each other**: and by *Retrenching* a considerable *Quantity* of the *vegetable Matter*, (which lay in such *Plenty* and *Purity* at the *Surface* of the *Antediluvian Earth*, and rendred it so *exuberantly fruitful*) and *Precipitating* it, (at the *Time* of the *Subsidence** of the general *Mafs* of *Earth* and other *Bodies*, which were before *raised up* into the *Water*) to such a *Depth* as to *bury* it, leaving only so much of it near the *Surface* as might just sufficiently *satisfy* the *Wants* of *humane Nature*, but little or no more; and even *that* not *pure*, not free from the *Intermixture* of meer *steril mineral Matter*, and such as is

H in

* Dr. Burnet Theory of the Earth.

† Vid. Consect. 2. supra.

* Part 4. Consect. 3.

* Vid. Consect. 3. supra.

in no wise fit for the *Nutrition* of *Vegetables*; but so that it should require *Industry* and *Labour* to excite it, and not yield a competent *Crop* without *Tillage* and *Manure*. That, by this *Means*, a great Part of that *Time*, which the *Inhabitants* of the former *Earth* had to spare, and whereof they made so ill *Use*, was employ'd, and taken up in *Digging* and *Plowing*, in making Provision for *Bread*, and for the *Necessities* of *Life*: and that *Excess* of *Fertility*, which contributed so much to their *Miscarriages*, was retracted and cut off.

That had the *Deluge* been aimed only at *Mankind*, and its utmost *Design* meerly to punish that *Generation*, and thereby to deter *Posterity* from the like *Offenses*, this might have been brought about by *Means* much more compendious, and obvious too, and yet equally terrifying and exemplary. *Mankind*, I say, might have been taken off at a far cheaper *Rate*; without this *Ransacking* of *Nature*, and Turning all Things topsie-turvy: without this *Battering* of the *Earth*, and *Unbinging* the whole *Frame* of the *Globe*. The *Business* might

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might have been done as effectually by *Wars*; the *Heart* of every *Man* of them was in the *Hand* of *God*, and he could easily have made them *Executioners* of his *Wrath* upon one another. He had the *Command* of *Famine*, of *Pestilence*, and a thousand other *Disasters*, whereby he could have carry'd them off by *Scholes*, yea swept them all clear away. Besides, he had the whole *Artillery* of the *Sky* in his *Power*, and might presently have *Thunder-struck* them all, or *destroyed* them by *Fire* from *Heaven*. But none of all *these* were used; though 'tis most apparent that any of them would have been as *fatal* and *pernicious* to *Man* as the *Deluge* was. For the *Design* lay a great deal *deeper*: and *these* would have fallen short of it. *These* would never have reach'd the *Earth*: nor affected *that* in the least. They could never have touch'd the *Head*: or stopped the *Source* of these unhappy *Misdemeanours*, for which the *Punishment* was sent. *That* was what nothing but a *Deluge* could reach; and as long as the *Cause* remained: as long as the *old Tempta-*

tion was still *behind*, every *Age* would have lain under *fresh Inducements* to the *same Crimes* : and there would have been a *new Necessity* to *Punish* and *Reclaim* the *World* : to *Depopulate* the *Earth*, and *Reduce* it again to a vast *Solitude*, as constantly as there succeeded a *new Age* and *Race* of *Men*. For the *Terror* of the *Calamity* would not have extended it self much *farther* than the *Men* which *suffer'd* under the *Weight* of it : and a *few Years* would have worn out, in great measure, the *Impressions* it made. This we see even from the *Example* of the *Deluge* it self. As formidable as *that* was to those who lived at, or near the *Time* of it, who saw the prodigious *Devastations* it had made, the *horrible Methods* by which 'twas brought about, and the *Reason* why 'twas inflicted : and to *their Posterity*, for a few *Generations* ; the *Fright* was not *lasting* : 'twas not long e'er the *Sting* of it was worn out. And though the *Elder Ages* knew full well that there had been such a *Deluge* : and had some *Tradition* of the cruel *Desolation* it made ; yet by
Degrees

Degrees the *Particulars* of it were drop'd, and the most *frightful Passages* bore the *least Share* in the *Relation*; being probably so *strange* as to be hardly *credible*: and carrying rather an Appearance of *Figment* and *Invention*, in those that handed down the *Memory* of it, than of *Truth* and *Reality*. So that upon the whole 'tis very plain that the *Deluge* was not sent only as an *Executioner* to *Mankind*: but that its *prime Errand* was to *Re-form* and *New-mold* the *Earth*.

That therefore, as much *Harshness* and *Cruelty* as this *great Destruction* of *Mankind* seemingly carries along with it: as *wild* and *extravagant* a Thing as that *Dissolution* of the *primitive Earth* appear'd at first Sight; all the *Severity* lay in the *Punishment* of *that Generation*, (which yet was no more than what was *highly just*, yea and *necessary* too:) and the *whole* of the *Tragedy* terminated there. For the *Destruction* of the *Earth* was not only an *Act* of the profoundest *Wisdom* and *Forecast*; but the most *monumental Proof*, that could ever possibly have been

crying any commendable *Accomplishments* either of *Body* or *Mind*, (that is what no Man will, I hope, suspect me of) but only an Intimation that *these* are not of any solid *Use*, or real *Advantage*, unless when aiding and serviceable to the *other*.

Nor does this *grand Catastrophe* only present us with Demonstrations of the *Goodness*, but also of the *Wisdom* and *Contrivance* of its *Author*. There runs a long *Train of Providence* thro' the *whole* : and shines brightly forth of all the various *Accidents* of it. The *Consolidation* of the *Marble*, and of the *Stone*, immediately after their *Settlement* to the Bottom : the *Disruption* of the *Strata* afterwards : their *Dislocation*, the *Elevation* of some, and *Depression* of others of them, did not fall out at *Random*, or by *Chance* : but were managed and directed by a more steady and discerning *Principle*. For Proof whereof, this is indeed the proper *Place* ; but, in regard that there are some Things advanced in the succeeding, or *third Part* of this *Discourse*, which give some *farther Light* to this *Matter*,

ter, I shall beg leave to break off here, and to deferr it a while, untill I have first propos'd them.

Thus have I drawn up a *brief Scheme* of what befell the *Earth* at the *Deluge* : and of the *Change* that it then underwent. I have, by comparing its *Antediluvian** with its *present State*, found where chiefly *the Difference* lay ; viz. in *Degree of Fertility*. I have endeavour'd also to discover the *Reason* why this *Change* was made in it. For, since that the *Process* of it was so *solemn* and *extraordinary* : that there were so *many*, and those so *strange Things* done : that the *first Earth* was perfectly *unmade* again, taken all to Pieces, and *framed a-new* ; and, indeed, the very *same Method* that was used in the *original Formation* of it, used likewise in this *Renovation* ; our *Earth* standing the *first Step* after its *Dissolution*, in the *same Posture* that the *Primitive Earth* did the first Step after its *Rise* out of Nothing ; which the *Reader* will easily find by conferring the *fifth Proposition* of *this Part* with *Gen. i. ver. 2. and 9* : since likewise there was

* Confer
Part 3.
Sect. 2.
Conf. 7.

was so mighty an *Hand** concern'd, and which does not act without great and weighty *Reasons*, there could be no *Doubt* but that there was some real and very necessary *Cause* for the making that *Alteration*. Nor was such a *Cause* very hard to be found out. The first *Earth* was suited to the first *State* of *Mankind*, who were the *Inhabitants* of it, and for whose *Use* 'twas made. But when *Humane Nature* had, by the *Fall*, suffer'd so great a *Change*, 'twas but necessary that the *Earth* should undergo a *Change* too, the better to *accommodate* it to the *Condition* that *Mankind* was then in : and such a *Change* the *Deluge* brought to pass.

But least the *Brevity* which I have above us'd, and which indeed I am ty'd up to, in my Representation of this Matter, should render it liable to *Misconstruction* : or that any one should suspect, that what I have deliver'd concerning the *Fertility* of that *Earth*, does not well square with the *Mosaic* Description of it, I must beg leave to make a *Digression* here, that I may explain my

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my self a little more upon that Head. And that the Reader may himself be Judge in the Case, I shall fairly lay down Moses's Sense of it in his own Words.

Verf. 17. *And unto Adam he said, be- Gen. iii.*
cause thou hast hearkned unto the
Voice of thy Wife, and hast eaten
of the Tree of which I commanded
thee, saying, thou shalt not eat of
it, Cursed is the Ground for thy
sake ; in Sorrow shalt thou eat of
it all the Days of thy Life.

Verf. 18. *Thorns also and Thistles*
shall it bring forth to thee : and thou
shalt eat the Herb of the Field.

Verf. 19. *In the Sweat of thy Face*
shalt thou eat Bread, till thou re-
turn unto the Ground ; for out of
it wast thou taken : for Dust thou
art, and unto Dust shalt thou return.

Verf. 23. *Therefore the Lord God sent*
him forth from the Garden of Eden,
to till the Ground from whence he
was taken.

Verf. 2. *Cain was a Tiller of the Gen. iv.*
Ground.

All which may be well reduced
to two plain and short Propositions.

1. That

1. That *Adam's* Revolt drew down a *Curse* upon the *Earth*.

2. That there was some sort of *Tillage*, or *Agriculture* used before the Deluge.

As to the former, the *Curse* upon the *Earth*, I shall not in the least go about to extenuate the Latitude of it : or to stint it only to the Production of Weeds, of *Thorns*, *Thistles*, and other the less useful Kinds of *Plants* : but shall give it its full Scope, and grant that no less than an universal *Restraint* and *Diminution* of the *primitive Fruitfulness* of the *Earth* was intended by it ; this indeed seeming to be the plain and genuine *Meaning* of the *Words*. But the Question is, whether this *Curse* was *presently* inflicted or not : whether it was succeeded with an *universal Sterility*, and the *Earth's* native and original *Exuberance* all straitways check'd and turned to as general a *Desolation* and *Barrenness*. And here I entreat it may be taken Notice, that *this* was but *one*, and that much the *lesser* Part of the *Sentence* pass'd upon *Adam*. The other was *Death* * ; which, 'tis most certain,

* *Confer*
Rom. v.
12. and
1 Cor. xv.
21, 22.

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certain, was not *immediately* inflicted. And yet *this* was pronounc'd at the same Time, and with the same Breath, that the other was; *Unto Dust shalt thou return.* Nay and much more emphatically a little before*, *In the Day that thou eatest¹⁷ thereof thou shalt surely dye.* This was exceedingly peremptory: and the *very Day* fix'd likewise. Notwithstanding, through the Clemency and Goodness of God, *Execution* was delay'd for a long time; *Adam* being *repriev'd* for eight or nine hundred Years*. The Dominion of *Death* over him commenc'd indeed not only the same Day that *Sentence* was past, but the very Minute that he tasted the forbidden *Fruit*: and *Mortality* went hand in hand with the *Transgression*. But 'twas a *long Time* before it had rais'd any *Trophies*: or made a final and absolute Conquest.

Why therefore may we not as well suppose the *other Part* of the *Sentence*, the *Sterilizing* the *Earth*, was also *suspended* for some Time, and *deferr'd* till the *Deluge* happen'd, and became the Executioner of it? 'Tis certainly very hard to imagine
that

that God should *destroy* the *Work* of his Hands almost as soon as he had *finish'd* it : that all Things should be *unbinged* again by such time as they were well *ranged* and put in *Order* : and that the *Fragrancy* and lovely *Verdure* which then appear'd every where, and which had but just shew'd it self, should be nipp'd in the Bud, and *blasted* all of a sudden. To be short, 'tis, I think, most apparent, that as on the other Part *Mortality* did presently *enter* and *take place*, but got not full *Possession* of many *Ages* after : so here, *Thorns*, *Thistles*, and other the like *Consequences* of this *Curse*, immediately sprung out of the *Ground*, and manifested themselves on every Side ; but it had not its full *Effect*, nor was the Earth *impoverish'd*, or its *Fertility* sensibly *curb'd*, 'till the *Deluge*. And, for Proof of *this*, I appeal to the *Remains* of *that Earth* ; the *Animal* and *Vegetable Productions* of it still preserv'd ; the vast and incredible *Numbers* whereof notoriously testify the extreme *Luxuriance* and *Fecundity* of it *. And I need but produce *these* as Evidences

* Confer
Part VI.
Conf. 4, 5.

Evidences that at the Time that the *Deluge* came, the *Earth* was so loaded with *Herbage*, and throng'd with *Animals*, that such an *Expedient* was even wanting to ease it of the *Burden*, and to make Room for a *Succession* of its *Productions*. For *this* also I appeal to *Moses* himself, who openly acknowledgeth that this *Curse* did not take Place effectually 'till the *Deluge*. For he tells us, that, after the *Deluge* was over, and *Noah* and his Family came forth of the Ark, *He builded an Altar unto the Lord, and offer'd Burnt-Offerings on the Altar : and the Lord smelled a sweet Savour, and the Lord said in his heart, I will not again CURSE THE GROUND any more, neither will I again smite any more every thing living as I have done**. * Gen. viii. 20, 21.

Wherein he plainly refers to the *Curse* denounc'd above, at the Apostacy of *Adam* ; implying that it was not fulfilled 'till the *Deluge*. And, a little after, he as plainly intimates, that the *Fulfilling* of it lay in the *Destruction* of the *Earth* then wrought. For, speaking again of the same Thing, instead of the Expression

pression [*Curse the Ground*] here used, he makes use of [*Destroy the Earth.*] The whole Passage runs thus ; *And I will establish my Covenant with you, neither shall all Flesh be cut off any more by the Waters of a Flood : neither shall there any more be a FLOOD TO DESTROY THE EARTH* *.

* Gen. ix.
11.

Nor is it indeed in any wise strange that this *Curse* had not its *Effect* sooner ; especially since 'twas not limited to any Time. There are so many *Precedents* on Record in *Holy Writ* of this Way of proceeding, that no one can be well ignorant of them ; so that I shall not need to charge this Place with more than one, and that shall be the Case of *Ham* ; for which we are likewise beholden to the same Author, *Moses*. This Person, by his indiscreet and unnatural *Derideing* and *Exposing* of his *Father*, incurs his *Indignation*, and *Curse*. But, which is very remarkable, *Noah* does not lay the *Curse* upon *Ham*, who was actually guilty of the Crime ; whether out of greater *Tenderness*, he being of the two nearer related unto him, or
for

for what other Reason I shall not here enquire, but transfers it to *Canaan*. *Cursed be Canaan; a Servant of Servants shall he be to his Brethren: to Shem and to Japhet.* Gen. ix. 25, 26, 27. Nay, which is still more, this was never inflicted upon *Canaan* in Person, but upon his Posterity; and that not 'till many Generations afterwards, at such Time as the *Israelites*, returning out of *Egypt*, possess'd themselves of the Country of the *Canaanites*, and made them their *Servants*. The Story is so well known, that I shall not need to point it out to the Reader, who may peruse it at his Leisure. 'Twas well on wards of a thousand Years before ever this *Curse* began to take effect: before the *Canaanites* were brought under *Servitude* by the *Israelites*, who were descended from *Shem*: and a great many more before 'twas finally accomplish'd, and they subjected unto the Posterity of *Japhet*. To conclude, 'twas really a longer time before this, than it was before the other, the *Curse* upon the *Earth*, was fully brought about.

To proceed therefore to the *other Point*, the *Tillage* of the *Earth* before the *Deluge*. That there was *Tillage* bestow'd upon it *Moses* does indeed intimate in general and at large; but whether it was bestow'd on *all*, or only upon *some Parts* of that *Earth*: as also *what Sort* of *Tillage* that was, and *what Labour* it cost, is not express'd; so that for all this we are at *Liberty*, and may use our *Discretion*. For the present I must pass by the *Enquiry*: but in due Place I hope to give some Satisfaction in it, and to shew that *their Agriculture* was nothing near so *laborious*, and *troublesome*, nor did it take up so much *Time* as *ours* doth. That's a *Consequence* of the *Proof* of the greater *Fertility* of that *Earth*; it being plain that the more it exerted that *Fertility*, the less Need there was of *Manure*, of *Culture*, or *Humane Industry* to excite and promote it. Nor can any Man reasonably suspect, because of this Mention of *Tillage*, that the *Curse* upon the *Ground* was come on, or that the *primitive Exuberance* of the *Earth* was *lessen'd* and *abridg'd*, before

fore the *Deluge*; for *Moses* makes mention of *Tillage* before ever *Adam* was created; *There was not*, says he*, *a man to Till the Ground*: * Gen.ii.3. and consequently, there would have been requisite such a *Tillage*, as *this* which he speaks of in these three Chapters, though the *Curse* had never been *denounc'd*, or *Man* had not *fallen*. But 'tis highly probable that upon *Adam's* Disobedience, Almighty God chased him out of *Paradise*, the *fairest* and most *delicious* Part of *that Earth*, into some other the most *barren* and *unpleasant* of all the whole *Globe*; the more effectually to signify his *Displeasure*, and to convince that unhappy Man how great a *Misfortune* and *Forfeiture* he had incurred by his late *Offense*. And here, above all other Parts of the *Earth*, there would be *Work* and *Employ* for him, and for his Son *Cain*.

And thus much may serve, for the present, to shew that my *Account* of the *Antediluvian Earth* is so far from *Interfereing* with that which *Moses* hath given us, that it holds forth a natural and unforc'd *Inter-*
I 2
pretation

pretation of his *Sense* on this *Subject*. There are a few other *Passages* in the same *Author* which may require some *Explication*; but they are none of them *such* that a Reader of moderate Understanding may not easily clear, without my Assistance, so that I shall not crowd *this Piece* with them; for I fear 'twill be thought that I have already taken too great a *Liberty*.

The *Compass* that I am confin'd unto, by *the Rules* of this kind of *Writing*, is so narrow, that I am forced to pass over *many Things* in Silence, and can but just touch upon *others*. To lay down every thing at *Length*, and in its *full Light*, so as to obviate all *Exceptions*, and remove every *Difficulty*, would carry me out too far beyond the *Measures* allowed to a *Traët* of *this Nature*. That's the *Business* of the *Larger Work*, of which *this* is only the *Module* or *Platform*. In *that Work* I hope to make amends for these *Omissions*, and particularly shall consider

What was the immediate *Instrument* or *Means* whereby the *Stone*,
and

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and other *solid Matter* of the *Antediluvian Earth* was *dissolved*, and reduced to the *Condition* mentioned *Conf. 2.* of this Part.

Why the *Shells, Teeth, Bones*, and other Parts of *Animal Bodies* : as also the *Trunks, Roots*, and other Parts of *Vegetables*, were not *dissolved*, as well as the *Stone*, and other *Mineral Solids* of *that Earth*. Of this I shall assign a plain and *Physical Reason*, taken meerly from the *Cause* of the *Solidity* of these *Mineral Bodies* ; which I shew to be quite *different* from *that* whereunto *Vegetables* and *Animals* owe the *Cohasion* of their *Parts* : and that *this* was *suspended* at the Time that the *Water* of the *Deluge* came forth ; which the *other* (I mean the *Cause* of the *Cohasion* of the Parts of *Animals* and *Vegetables*) was not. •

What was the Reason that (in case the *Terrestrial Globe* was entirely *dissolved*, and there be now, and was then, a *Space* or *Cavity*, in the *Central Parts* of it, so large as to give Reception to that mighty *Mass* of *Water* which covered the *Earth* at the *Deluge**) the *Terrestrial Mat-*

* *Vid.*
Part 3.
Sect. 1.
Confect. 1.
and Sect. 2.
Conf. 2. 3.

ter which first subsided, (as in *Conse.* 3. *supra*) did not fill the said Cavity, and descend quite down to the Center, but stop'd at that Distance from it, forming an arch'd *Expansum*, or rather a *Sphere* around it; which is now the lowest *Stratum*, and Boundary of that vast *Receptacle* of Water. As also how this Water was raised at the Deluge: by what *Issues* or *Outlets* it came forth: what succeeded into the Room of it, whilst absent; and which Way it return'd back again.

• By what Means the *Strata* of Stone, and Marble, acquir'd such a Solidity, as soon as the Matter, whereof they consist, had subsided, and was well settled to the Bottom, as in *Conse.* 4. of this Part.

What was the immediate Agent which effected that *Disruption* of the *Strata*, and their *Dislocation* afterwards; whereof in *Conse.* 6. of this Part.

• And because there have been some *Conjectures* formerly started by Learned Men about the Formation of Sand-Stone, the Origin of Mountains, and of Islands, that are repugnant to

to what I have *here* advanc'd upon those Subjects, I am obliged particularly to consider them. That therefore they may not remain as *Obstacles* to those who are less skillful in these Things, I shall weigh their *Arguments*, detect the *Invalidity* of them, and prove, against them,

That the *Sand-Stone*, now in *Being*, is not as old as the *Earth* it self: nor hath it been *consolidated* ever since the *Creation* of the *World*, as some Authors have believed.

That *Sand-Stone* does not now grow by *Juxtaposition*, as they speak; that is by continual *Addition* of new *Matter*; in like Manner as the Bodies of *Animals* and of *Vegetables* grow, and are augmented; as others were of Opinion.

That *Sand-Stone* does not *still consolidate*: i. e. that *Matter* which was, a few Years ago, *lax*, *incoherent*, and in *Form* of *Earth*; or of *Sand*, does not become daily more *hard* and *consistent*, and by little and little acquire a perfect *Solidity*, so as to turn to *Stone*; as others have asserted.

That the *Mountains* of our *Earth* have not had *Being* ever since the *Creation* : and stood as long as the *Earth* it self ; as some Writers have thought.

That the said *Mountains* were not raised *successively*, and at *several Times*, being flung up or elevated by *Earthquakes*, some at one Time, and some at another, as those *Earthquakes* happened. That these are so far from *raising* Mountains, that they *overturn* and *fling down*, some of those which were before standing : and *undermine* others, sinking them into the *Abyss* underneath*. That of all the *Mountains* of the *whole Globe*, which are very *numerous*, and many of them extremely *large*, and consequently cannot be supposed to have been all thus raised without the *Notice* of *Mankind*, yet there is not any *authentick Instance*, in all *History*, of so much as *one single Mountain* that was heaved up by an *Earthquake*. That the *new Mountain* in the *Lucrine Lake*, not far from *Pozzuolo* in *Italy*, called *Monte di Cinere*, which is alledged, by the *Favourers* of *this Opinion*, as an *Instance*

* Confer
Part III.
Sect. 1.
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stance in Behalf of it, was not raised thus; the *Relators* of that *Accident*, as well those who were then living, as they who wrote since, unanimously agreeing that this is not a Mountain consisting, as *others* do, regularly of *Strata**, but a meer *confused Heap* of *Stones*, *Cinders*, *Earth*, and *Ashes*, which were spued up out of the *Bowels* of the *Earth*, by the *Eruption* of a *Volcano*, which happened there, in the Year 1538. And though this *Eruption* was preceded by several *Earthquakes* (the Country all round having been frequently shaken for almost the Space of two Years before) as those of *Ætna*, *Vesuvius*, and *Hecla* usually are, yet *this Hill* was not *elevated* or *beaved up* by any of those *Earthquakes*, but the *Matter*, whereof 'tis compiled, discharged out of the *Volcano*, as aforesaid; in like manner as *Ætna*, *Vesuvius*, and the rest, fling forth *Stones*, *Cinders*, &c. upon any extraordinary *Eruption* of them.

That there have not been any *Ilands* of Note, or considerable Extent, *torn* and *cast off* from the *Continent* by *Earthquakes*, or *sever'd* from

* Confer
pag. 55:
as also
Part 2.
Consect. 3.
supra.

from it by the boisterous *Insults* of the *Sea*. That *Sicily*, *Cyprus*, the *Negropont*, and many more, which have been supposed by some to be only *dismembred Parcels* of the *Main-Land*, and anciently parted from it by one or other of these *Means*, yet really never were so: but have been *Islands* ever since the Time of the *Noetick Deluge*.

Unto this Second Part I shall annex,

A *Discourse* concerning the *Trees*, which are commonly called *Subterranean Trees*, or *Fossil Wood*, and which are found in great Plenty buried amongst other *Vegetable Bodies* in *Mosses**, *Fens*, or *Bogs*, not only in *several Parts* of *England*, but likewise in many *Foreign Countries*; wherein I shall shew, from *Observations* made upon the *Places* where these *Trees* are digg'd up: upon the *Trees* themselves: their *Position* in the *Earth*, and other *Circumstances*, that they were lodged thus by the *Deluge*, and have lain *here* ever since. That there are found *various Kinds* of these *Trees*; and several of *considerable Bulk*, so buried

* *Moss* is the Name used all over the North of *England* instead of *Morafs*, or *Marsh*; of which indeed *Moss* seems to have been a Corruption.

buried in *Islands* where no *Trees* at all do, or will now grow; the *Winds* being so fierce, and the *Weather* so severe, as not to suffer any thing to prosper or thrive beyond the Height of a *Shrub*, in any of all those *Islands*, unless it be protected by *Walls*, as in *Gardens*, or other like *Coverture*. That the said *Trees* are in some Places found inclosed in the *Stone* of *Quarries* and of *Rocks*; buried amongst *Marle*, and other *Kinds* of *Earth*, as well as in this *Peat* or *Moss-Earth*. That they were originally lodged indifferently amongst all *Sorts* of *Terrestrial Matter*, which lay near the *Surface* of the *Earth**: and that they are at this Day found very seldom unless in this *Peat-Earth*, is merely *accidental*; this *Earth* being of a *bituminous* and *mild Nature*; so that the *Trees* lay all this while, as it were, *embalm'd* in it, and were by that Means preserved down to our *Times*; whilst those which chanced to be lodged in other *Earth*, that was more *lax* and *pervious*, decayed in tract of Time, and rotted at length, and therefore do not now appear at

* Confer
Consect. 3.
supra.

at all, when we dig and search into *those Earths*. Or if any thing of them do *appear*, 'tis only the *Ruins*, or some slight *Remains* of them; there being very rarely found any *Trunks of Trees*, in these *laxer Earths*, that are *intire*, or tolerably *firm* and *sound*. To conclude, from several of the *aforesaid Circumstances* I shall evince that these *Trees* could never possibly have been *reposed* thus by any other Means than the *Deluge*: neither by *Men*: nor by *Inundations*: nor by *Deterrations* *: nor by violent and impetuous *Winds*: nor by *Earthquakes*; which are the *several Ways* whereby *Learned Men* have thought they were thus *bury'd*.

* Confer
Part 5.
Conject. 2.



PART



PART III.

Concerning the Fluids of the Globe.



SECT. I.

Of the great Abyſs. Of the Ocean. Concerning the O- rigin of Springs, and Rivers. Of Vapours, and of Rain.



HAVING thus done with
the more *bulky* and *corpulent* Parts of the *Globe*, the
next Place in course is due
unto *Metalls* and *Minerals*, which
are the only remaining Part of the
Terrestrial Matter of it not yet treat-
ed of. And accordingly I should
now

now pass on to *these* ; but the present Oeconomy and Disposal of some of them being wholly owing to the *Motion* and *Passage* of *Water* in the interiour Parts of the *Earth*, I have for that Reason chosen rather, that I may be as brief as possible, and avoid all needless Repetitions, to wave *them* for a while, 'till I have first offered what I have to say about *that*.

The *Water* therefore of the Globe, as well that resident *in it*, as that which floats *upon it*, is the Subject which I purpose here to prosecute. In order whereunto, I shall sub-divide this third Part into *two Sections* ; the *former* whereof will comprehend what relates to the present and *natural State* of the *Fluids* in and upon the *Earth* : the *other*, what concerns that extraordinary *Change* of this *State* which happen'd at the *Deluge*, and how that *Change* was wrought.

At the Head of the first of these *Sections* I prefix a new Set of *Observations touching the Fluids of the Terraqueous Globe* : the *Sea*, *Rivers*, and *Springs* : the *Water of Mines*,
of

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of Cole-pits: of Caves, Grotts, and the like Recesses: as also concerning *Vapours, Rain, Hail, and Snow.*

And because this is a *Subjeſt* of that vast *Latitude*, that the Strength of one ſingle Man will ſcarcely be reckon'd ſufficient effectually to cultivate and carry it on, I have taken in the joint Aſſiſtance of *other Hands*, and ſuper-added, to my own, all ſuch *Relations* as I could procure from *Persons* whoſe Judgment and Fidelity might ſafely be rely'd upon, about the *Sea, Lakes, Rivers, Springs,* and *Rain*, not only of *this Iſland*, but many *other Parts* of the *World* beſides. Nor do I neglect thoſe which are already extant in the *Publiſhed Diſcourſes* of diligent and inquiſitive Men.

From all which *Observations*, joyn'd with thoſe made by my ſelf, I prove,

That there is a mighty *Collection* of *Water* incloſed in the *Bowels of the Earth*, conſtituting an huge *Orb* in the *interiour* or *central Parts* of it; upon the Surface of which *Orb* of *Water* the *Terreſtrial Strata* are expanded. That *this* is the ſame
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which *Moses* calls the *Great Deep*, or *Abyss*: the ancient Gentil Writers, *Erebus*, and *Tartarus*.

2. That the *Water* of this Orb communicates with that of the Ocean, by means of certain *Hiatus's* or *Chasmes* passing betwixt it and the Bottom of the Ocean. That they have the same common Center, around which the *Water* of both of them is compiled and arranged; but in such Manner, that the ordinary Surface of this Orb is not level with that of the Ocean, nor at so great a Distance from the Center as that is, it being for the most part restrained and depressed by the *Strata* of Earth lying upon it. But wherever those *Strata* are broken, or so lax and porous that *Water* can pervade them, there the *Water* of the said Orb does ascend: fills up all the *Fissures* whereinto it can get Admission or Entrance: and saturates all the Interstices and Pores of the Earth, Stone, or other Matter, all round the Globe, quite up to the Level of the Surface of the Ocean.

3. That there is a perpetual and incessant Circulation of *Water* in the Atmosphere;

Atmosphere; it arising from the Globe in Form of *Vapour*, and falling down again in *Rain, Dew, Hail, and Snow*. That the *Quantity of Water* thus rising and falling is *equal*; as much returning back in *Rain, &c.* to the whole *terraqueous Globe*, as was exhaled from it in *Vapours*. That tho' the *Quantity of Water* thus rising and falling be certain and constant as to the *whole*, yet it varies in the several *Parts* of the *Globe*; by reason that the *Vapours* float in the *Atmosphere*, sailing in *Clouds* from Place to Place, and are not restored down again in a Perpendicular upon the *same* precise Tract of *Land, or Sea*, or *both* together, from which Originally they arose, but *any other* indifferently. So that *some Regions* receive back *more* in *Rain* than they send up in *Vapour*; as, on the contrary, *others* send up more in *Vapour* than they receive in *Rain*. Nay, the very *same Region*, at one *Season*, sends up *more* in *Vapours* than it receives in *Rain*: and, at another, receives *more* in *Rain* than it sends up in *Vapour*. But the *Excesses* of one *Region* and *Season* compensa-

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ting the *Defects* of the others, the Quantity *rising* and *falling* upon the *whole Globe* is *equal*; however *different* it may be in the several *Parts* of it.

4. That the *Rain* which falls upon the *Surface* of the *Earth* partly runs off into *Rivers*, and thence into the *Sea* : and partly *sinks* down into the *Earth*, insinuating it self into the *Interstices* of the *Sand*, *Gravel*, or other *Matter* of the exterior or uppermost *Strata*. Whence *some* of it passes on into *Springs*, *Wells*, and into *Grotts*, and *stagnates* there, 'till 'tis by *Degrees* again *exhaled*. *Some* of it glides into the *perpendicular Intervalls* of the solid *Strata*; where, if there be no *Outlet* or *Passage* to the *Surface*, it *stagnates*, as the other; but, if there be such *Outlets*, 'tis by them *refunded* forth together with the ordinary *Water* of *Springs* and *Rivers*. And the *rest*, which, by reason of the *compactness* of the *terrestrial Matter* underneath, cannot make its *Way* to *Wells*, the *perpendicular Fissures*, or the like *Exits*, only *saturates* the uppermost *Strata* : and in time *remounts*
up

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up again in *Vapour* into the *Atmosphere*.

That altho' *Rains* do thus fall into and augment *Springs* and *Rivers*, yet neither *the one* nor *the other* do derive the *Water*, which they ordinarily refund, from *Rains*; notwithstanding what very many *Learned Men* have believed. 5.

That *Springs* and *Rivers* do not proceed from *Vapours* raised out of the *Sea* by the *Sun*, born thence by *Winds* unto *Mountains*, and there condensed; as a modern ingenious *Writer* is of Opinion. 6.

That the abovementioned great subterranean Magazinè the *Abyss*, with its Partner the *Ocean*, is the *Standing Fund* and *Promptuary* which supplies *Water* to the Surface of the Earth: as well *Springs* and *Rivers*, as *Vapours* and *Rain*. 7.

That there is a nearly uniform and constant *Fire* or *Heat** disseminated 8.

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nated

* *Heat* and *Fire* differ but in *Degree*: and *Heat* is *Fire*, only in lesser Quantity. *Fire* I shall shew to be a *Fluid* consisting of Parts extremely small and light, and consequently very *subtile*, *active*, and susceptible of *Motion*. An Aggregate of these Parts in such Number as to be visible to the Eye, is what we call *Flame* and *Fire*: a lesser, thinner, and more dispersed Collection, *Heat* and *Warmth*.

nated throughout the *Body* of the *Earth*, and especially the *interiour Parts* of it; the *Bottoms* of the deeper *Mines* being very *sultry*, and the *Stone* and *Ores* there very sensibly *hot*, even in *Winter*, and the colder *Seasons*. That 'tis *this Heat* which *evaporates* and *elevates* the *Water* of the *Abyss*, buoying it up indifferently on every *Side*, and towards all *Parts* of the *Surface* of the *Globe*; pervading not only the *Fissures* and *Intervalls* of the *Strata*, but the very *Bodies* of the *Strata* themselves, *permeating* the *Interstices* of the *Sand*, *Earth*, or other *Matter*, whereof they consist: yea even the most firm and dense, *Marble*, and *Sand-stone*. For these give *Admission* to it, though in lesser *Quantity*, and are always found *saturated* with it; which is the *Reason* that they are *softer*, and cut much more easily, when *first* taken out of their *Beds* and *Quarries*, than afterwards, when they have lain some time exposed to the *Air*, and that *Humidity* is evaporated.

That this *Vapour* proceeds up *directly* towards the *Surface* of the *Globe*

Globe on *all Sides*, and, as near as possible, in *right Lines*, unless *impeded* and *diverted* by the Interposition of *Strata* of *Marble*, the denser Sorts of *Stone*, or other like Matter, which is so *close* and *compact* that it can admitt it only in *smaller Quantity*, and this very slowly and leisurely.

That where the *Vapour* is thus *intercepted* in its Passage, and cannot penetrate the *Stratum* diametrically, *some* of it glides along the *lower Surface* of it, permeating the *horizontal Intervall* which is betwixt the said dense *Stratum* and that which lies underneath it. *The rest* passes the *Interstices* of the *Mafs* of the *subjacent Strata*, whether they be of *laxer Stone*, of *Sand*, of *Marle*, or the like, with a *Direction* parallel to the *Site* of those *Strata*, 'till it arrives at their *perpendicular Intervalls*.

That this *Water* being thus approach'd to these *Intervalls*, in case the *Strata*, whereby the ascending *Vapour* was collected, and *condensed* into *Water*, as we usually speak, in like Manner as by an *Alembick*, hap-

pen to be *raised* above the *Level* of the *Earth's* ordinary *Surface*, as those *Strata* are whereof *Mountains* consist, then the *Water*, being likewise got *above* the said *Level*, flows forth of those *Intervalls* or *Apertures*, and, if there be no *Obstacle* without, forms *Brooks* and *Rivers*. But where the *Strata*, which so *condense* it; are not *higher* than the *mean Surface* of the *Earth*, it *stagnates* at the *Apertures*, and only forms *standing-Springs*.

That though the *Supply* from this great *Receptacle* below be *continual*, and nearly the *same* at all *Seasons*, and *alike* to all *Parts* of the *Globe*, yet when it arrives at or near the *Surface* of the *Earth*, where the *Heat* (the *Agent* which *evaporates* and *bears* it up) is not so *constant* and *uniform* as is that resident *within* the *Globe*, but is subject to *Vicissitudes* and *Alterations*, being at certain *Seasons* *greater* than at *others*; being also *greater* in some *Climates* and *Parts* of the *Earth* than in *others*; it hence happens that the *Quantity* of *Water* at the *Surface* of the *Earth*, though sent up from the
Abyss

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Abyss with an almost constant Equality, is *various* and *uncertain*, as is the *Heat* here; at *some Seasons*, and in *some Countries*, the *Surface* *abounding*, and being even drown'd with the *Plenty* of it, the *Springs* *full*, and the *Rivers* *high*: at *other Seasons*, and in *other Countries*, both *Springs* and *Rivers* *exceeding low*, yea sometimes *totally failing*.

That when the *Heat* in the *exterior Parts* of the *Earth*, and in the *ambient Air*, is as *intense* as that in the *interiour Parts* of it, that *Water* which passes the *Strata* *directly*, mounting up in separate *Parcels*, or in *Form* of *Vapour*, does *not stop* at the *Surface*; because the *Heat* *there* is *equal*, both in *Quantity*, and *Power*, to that *underneath* which brought it out of the *Abyss*. This *Heat* therefore takes it *here*, and *bears it up*, part of it immediately out at the *Surface* of the *Earth*: the *rest*, thro' the *Tubes* and *Vessels* of the *Vegetables* which grow thereon, *Herbs*, *Shrubs*, and *Trees*, and along with it a *Sort* of *vegetative* *terrestrial* *Matter*, which it *detaches* from out the *uppermost Stratum* wherein these

* *Vid.*
Conf. 10.
infra.

* As does
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 the open
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 did not
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 thorow
Vegetables.

are planted. *This* it *deposes* in them, for their *Nutrimment*, as it passes thro' them*: and issuing out at the *Tops* and *Extremities* of them, it marches still on, and is *elevated* up into the *Atmosphere* to such *Height* that, the *Heat* being there *less*, it becomes *condensed*, unites and combines into small *Masses* or *Drops*, and at length falls down again in *Rain*, *Dew*, *Hail*, or *Snow**. And for the *Water*, which was *condensed* at the *Surface* of the *Earth*, and sent forth collectively into *Standing-Springs* and *Rivers*, *this* also sustains a *Diminution* from the *Heat* above; being *evaporated*, more or less, in *Proportion* to the greater or lesser *Intenseness* of that *Heat*, and the greater or lesser *Extent* of the *Surface* of the *Water* so sent forth.

That as these *Evaporations* are at *some Times* greater, according to the greater *Heat* of the *Sun*, so where-ever they alight again in *Rain*, 'tis as much superiour in *Quantity* to the *Rain* of colder *Seasons*, as the *Sun's Power* is then superiour to its *Power* in those *Seasons*. This is apparent even in these *Northern Climes*,

Climes, where the Sun's Power is never very great; our *Rains* in *June*, *July*, and *August*, being much greater than those of the colder Months: the Drops larger, and consequently heavier: falling thicker, faster, and with greater Force: striking the Ground, at their Fall, with Violence, and making a mighty Noise: beating down the Fruit from the Trees, prostrating and laying Corn growing in the Fields: and sometimes so filling the Rivers as to make them out-swell their Banks, and lay the neighbouring Grounds under Water. But much more apparent is it in the more Southern Regions: in *Abassinia*, *Nigritia*, *Guinea*: in the *East-Indies*: in *Brasil*, *Paraguay*, and other Countries of *South-America*; to instance in no more. In these the Sun shews a much greater Force: and their Rains (which are periodical, happening yearly much about the same Time, and lasting several Months) fall in such Quantities as to be more like Rivers descending, than Showers. And by these are caused those mighty periodical Inundations of the *Nile*, the *Niger*,

Niger, the Río da Volta : the Ganges : the Rio de las Amazonas, the Rio de la Plata, and other Rivers of those Countryes ; to which Inundation, Egypt, thro' which the Nile flows, the Indies, and the rest, owe their extraordinary Fertility, and those mighty Crops they produce after these Waters are withdrawn from off their Fields ; Rain-water, as I

* *Pag. 50. have already noted**, carrying along with it a sort of *Terrestrial Matter* that *fertilizes the Land*, as being proper for the *Formation of Vegetables.*

That when the *Heat*, in the *exterior Parts* of the *Earth*, and in the *ambient Air*, is *less* than that in the *interiour*, the *Evaporations* are likewise *less*. And the *Springs* and *Rivers* thereupon do not only *cease* to be *diminished**, in Proportion to the *Relaxation* of the *Heat*, but are much *augmented* ; a *great Part* of the *Water*, which ascends to the *Surface* of the *Earth* in *Vapour*, *stopping there*, for want of *Heat* to mount it thence up into the *Atmosphere*, and *saturating* the *superficial* or *uppermost Strata* with *Water* ; which by *Degrees* drains

* Confer
pag. 140.

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drains down into Wells, Springs, and Rivers, and so makes an Addition unto them.. And this is the Reason that these abound with Water in the colder Seasons so much more than they do in the hotter.

That the *Water*, which is thus dispensed to the *Earth* and *Atmosphere* by the *Great Abyss*, being carryed down by *Rains* and by *Rivers* into the *Ocean*, which, as hath been said, communicates, and stands at an *Equilibrium* with the *Abyss*, is by that Means *restored back* to that subterranean Conservatory; whence it returns again, in a *continual Circulation*, to the Surface of the *Earth*, in *Vapours*, and *Springs*. 9.

That the *final Cause* of this Distribution of *Water*, in such *Quantity*, to *all Parts* of the *Earth* indifferently in *Springs*, *Rivers*, and *Rain*: and of this *perpetual Circulation* and *Motion* of it, is the *Propagation of Bodies, Animals, Vegetables, and Minerals*, in a *continued Succession*. 10.
That for *Animals*, they either feed upon *Vegetables* immediately: or, which comes to the same at last, upon *other Animals* which have fed upon

upon them. So that *Vegetables* are the first and main Fund: and, fit *Matter* being supplied unto these, Provision is thereby made for the Nourishment of *Animals*; *Vegetables* being no other than so many *Machines* serving to derive that *Matter* from the *Earth*, to digest and prepare it, for their *Use*, leisurely and by little and little, as they can admitt and *dispose* of it, and as it is brought to them by the *Ministration* of this *Fluid*. That *Vegetables* being naturally fix'd and tyed always to the same *Place*, and so not able (as *Animals* are) to shift, and seek out after *Matter* proper for their *Nutrition*, 'twas indispensibly necessary that it should be brought to them: and that there would be some *Agent*, thus ready and at hand in all *Places*, to do them that *Office*, and so carry on this great and important *Work*. For this *Matter*, being impotent, sluggish, and inactive, hath no more Power to stir, or move to these *Bodies*, than they themselves have to move unto it. So that it must have lain eternally confined to its *Beds* of *Earth*, and then none of these *Bodies* could ever

ever have been *formed*, were there not *this*, or the like *Agent* to *educe* it *thence*, and bear it unto them. Nor does the *Water*, thus hurry'd about from Place to Place, serve only to *carry* the *Matter* unto these *Bodies*, but the *Parts* of it being very *voluble* and *lubricous*, as well as *fine* and *small*, it easily *insinuates* it self into, and placidly *distends* the *Tubes* and *Vessels* of *Vegetables*, and by that Means *introduces* into them the *Matter* it bears along with it, conveying it to the *several Parts* of them ; where *each Part*, by a particular *Mechanism* in the *Structure* of it, *detaches* and *assumes* those *Particles*, of the *Mass* so conveyed, which are proper for the *Nourishment* and *Augmentation* of *that Part*, incorporating *these* with it, and letting all the *rest* pass on with the *Fluid* ; those *Particles* which are either *superfluous*, and *more* than the *Parts* of the *Plant* can admitt and manage at one Time : or that are not *suitable* and *proper* for the *Nourishment* of any of the *Parts* of a *Plant* of *that Kind*, going out at the *Extremities* of it along with the *Water* *. And this

* Confer
Pag. 140.

this latter Office it does likewise to *Animals*; *Water*, and other *Fluids*, serving to convey the *Matter*, whereby they are *nourished*, from their *Stomachs* and *Guts*, thro' the *Lacteals* and finer *Vessels*, to the *several Parts* of their *Bodies*. But the *Formation* of *Animals* and *Vegetables*, being a Thing somewhat foreign to my *present Purpose*, I shall adjourn the *fuller Consideration* of it to another *Occasion*. How far *Water* is concern'd in the *Formation* of *Minerals*, will appear more at large in the *succeeding Part* of *this Work*.

- II. That 'tis this *Vapour*, or *subtile Fluid*, that, ascending thus incessantly out of the *Abyss*, and *pervading* the *Strata* of Gravel, Sand, Earth, Stone, and the rest, by Degrees *rots* and *decays* the *Bones*, *Shells*, *Teeth*, and other *Parts* of *Animals*: as also the *Trees*, and other *Vegetables*, which were lodg'd in those *Strata* at the *Deluge**; this *Fluid*, by its continual *Attrition*, as it passes successively by them, *fretting* the said *Bodies*, by little and little *wearing off* and *dissipating* their *constituent Corpuscles*, and at length quite

* Part 2.
Consect. 3.

quite dissolving and destroying their Texture. That yet it hath not *this Effect* indifferently upon all of them; those which happened to be reposed in the firmer and compacter Strata, e. g. of Marble, the closer Kinds of Sand-Stone, Chalk, and the like, being thereby protected in great Measure from its Attacks. For it passes through these only in lesser Quantity, and that slowly, and with Difficulty*. So that its Motion here being more feeble and languid, the Shells and other Bodies enclos'd in these are usually found very firm and intire, many of them retaining even their natural Colours to this Day, though they have lain thus above four thousand Years: and may doubtless endure much longer, even as long as those Strata, to which they owe their Preservation, shall themselves endure, and continue intire and undisturb'd. Whilst those which were lodg'd in Loam, Sand, Gravel, and the like more loose and pervious Matter, are so rotted and decayed, that they are now not at all, or very difficultly, distinguishable from the Loam, or other Mat-
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* Vid. Confess. 8. supra.

ter in which they lye. Not but that there are sometimes found, even in these *laxer Strata, Shells, Teeth*, and other *Bodies* that are still tolerably *firm*: and that have escaped pretty safe. But *these* are only such as are of a more than ordinary *robust* and *durable Constitution*, whereby they were enabled the better to withstand therepeated *Assaults* of the permeating *Fluid*, and to maintain their *Integrity*, whilst the other *tenderer Kinds* *perish'd* and were *destroyed*.

That this *subtile Fluid* exerts the *same Power* upon the *Surface* of the *Earth*, that it does in the *Bowels* of it. For as it is instrumental to the *Formation* of *Bodies here**, so is it likewise (by a *different Operation*, which I have not Room to describe in this Place) of the *Destruction* of them. And that *Corrosion* and *Dissolution* of *Bodies*, even the most *solid* and *durable*, which is vulgarly ascribed to the *Air*, is caused meerly by the *Action* of *this Matter* upon them; the *Air* being so far from *injuring* and *preying* upon the *Bodies* it *environs*, that it contributes to their

* Confer
Conf. 10.
supra.

their *Security* and *Preservation*, by *impeding* and *obstruſting* the *Action* of this *Matter*. Were it not indeed for the *Interpoſition* of the *Air*, they could never be able to make ſo long and *vigorous Reſiſtance* as now they do.

That this *Subterranean Heat* or 12.
Fire, which thus *elevates* the *Water* out of the *Abyſs*, being in any Part of the *Earth ſtop'd*, and ſo *diverted* from its *ordinary Courſe*, by ſome accidental *Glut* or *Obſtruſtion* in the *Pores* or *Paſſages* through which it uſed to *aſcend* to the *Surface*: and being by that Means *preternaturally aſſembled*, in *greater Quantity* than uſual, into *one Place*, it cauſes a great *Rarifaſtion* and *Intumeſcence* of the *Water* of the *Abyſs*, putting it into very great *Commotions* and *Diſorders*. And at the ſame *Time* making the like *Effort* upon the *Earth*, which is expanded upon the *Face* of the *Abyſs*, it occasions that *Agitation* and *Concuſſion* of it, which we call an *Earthquake*.

That this *Effort* is in ſome *Earthquakes* ſo *vehement* that it *splits* and *tears* the *Earth*, making *Cracks* or

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Chafmes

Chasmes in it some *Miles* in Length; which *open* at the *Instants* of the *Shocks*, and *close* again in the *Intervalls* betwixt them. Nay, 'tis sometimes so extremely *violent*, that it plainly *forces* the superincumbent *Strata* : *breaks* them all throughout, and thereby perfectly *undermines* and *ruins* the *Foundations* of them. So that, *these failing*, the *whole Traç*, as soon as ever the *Shock* is over, *sinks* down to rights into the *Abyss* underneath, and is *swallowed* up by it; the *Water* thereof immediately *rising* up, and forming a *Lake* in the Place where the said *Traç* before was. That several considerable *Traçs* of Land, and some with *Cities* and *Towns* standing upon them : as also *whole Mountains*, many of them very *large*, and of a *great Height*, have been thus totally *swallowed* up.

That this *Effort* being made in *all Directions* indifferently, upwards, downwards, and on every Side; the *Fire* dilating and expanding on *all Hands*, and endeavouring, proportionably to the *Quantity* and *Strength* of it, to get Room, and
make

make its Way through *all Obstacles*, falls as foul upon the *Water* of the *Abyss* beneath, as upon the *Earth* above; forcing it forth which Way soever it can find *Vent* or *Passage*: as well through its *ordinary Exits*, *Wells*, *Springs*, and the *Outlets* of *Rivers*, as through the *Ghasmes* then newly opened: through the *Camini* or *Spiracles* of *Ætna*, or other near *Volcanoes*; and those *Hiatu's* at the *Bottom* of the *Sea**; whereby the *Abyss* below opens into it, and communicates with it.

* *Vid.*
Consect. 2.
supra.

That as the *Water* resident in the *Abyss* is, in *all Parts* of it, stored with a considerable *Quantity* of *Heat*: and more especially in those where these extraordinary *Aggregations* of this *Fire* happen; so likewise is the *Water* which is thus forced out of it. Insomuch that, when thrown forth, and mix'd with the *Waters* of *Wells*, of *Springs*, of *Rivers*, and the *Sea*, it renders them very sensibly *hot*.

That it is usually expelled forth in vast *Quantities*: and with so great *Impetuosity*, that it hath been seen to spout up out of deep *Wells*, and

fly forth, at the *Tops* of them, upon the Face of the Ground. With like *Rapidity* it comes out of the *Sources* of *Rivers*; *filling* them so of a sudden as to make them *run over* their *Banks*, and *overflow* the neighbouring *Territories*; without so much as one Drop of *Rain* falling into them, or any other concurrent *Water* to raise and augment them. That it *spues* out of the *Chasmes*, opened by the *Earthquake*, in great *Abundance*; mounting up, in mighty *Streams*, to an incredible *Height* in the *Air*: and this oftentimes at many *Miles* Distance from any *Sea*. That it likewise *flies forth* of the *Volcanoes* in vast *Floods*, and with wonderful *Violence*. That 'tis forced through the *Hiatus's* at the *Bottom* of the *Sea* with such *Vebemence*, that it puts the *Sea* into the most horrible *Disorder* and *Perturbation* imaginable, even when there is not the least *Breath* of *Wind* stirring, but all, till then, *calm* and *still*; making it rage and *roar* with a most hideous and amazing *Noise*: raising its *Surface* into prodigious *Waves*, and tossing and rowling them about in
a very

a very strange and furious Manner : overfetting *Ships* in the Harbours, and *sinking* them to the Bottom ; with many other like *Outrages*. That 'tis refunded out of these *Hiatus's* in such *Quantity* also that it makes a vast *Addition* to the *Water* of the Sea ; *raising* it many *Fathoms* *higher* than ever it *flows* in the highest *Tides*, so as to pour it forth far beyond its usual *Bounds*, and make it *overwhelm* the adjacent *Country* ; by this Means ruining and destroying *Towns* and *Cities* : drowning both *Men* and *Cattle* : breaking the *Cables* of *Ships*, driving them from their *Anchors*, sometimes bearing them along with the *Inundation* several *Miles* up into the *Country*, and there running them aground : stranding *Whales* likewise, and other great *Fishes*, and leaving them, at its *Return*, upon *dry Land*.

That these *Phænomena* are not new, or peculiar to the *Earthquakes* which have happen'd in *our Times*, but have been observ'd in *all Ages* : and particularly these exorbitant *Commotions* of the *Water* of the

Globe. This we may learn abundantly from the *Histories* of former *Times*: and 'twas for this Reason that many of the *Ancients* concluded, rightly enough, that they were caused by the *Impulses* and *Fluctuation* of *Water* in the *Bowels* of the *Earth*. And therefore they very frequently called *Neptune* $\Sigma\epsilon\iota\tau\iota\chi\theta\omega\rho$, as also $\text{Ἐνδοτ}\chi\theta\omega\rho$, $\text{Ἐνδοτ}\chi\alpha\upsilon\theta$, and $\text{Τιναντοπορ}\alpha\iota\iota\tau\iota\varsigma$; by all which *Epithets* they denoted his *Power* of *Shaking* the *Earth*. They supposed that he presided over all *Water* whatever, as well that within the *Earth*, as the *Sea*, and the rest upon it: and that the *Earth* was supported by *Water*, its *Foundations* being laid thereon. Upon which Account it was they bestow'd upon him the Cognomen $\text{Ἰαντο}\chi\theta$, or *Supporter of the Earth*, and that of $\text{Θεμελι}\chi\theta$, or *The Sustainer of its Foundations*. They likewise believed that he, having a full *Sway* and *Command* over the *Water*, had *Power* to *still* and *compose* it, as well as to *move* and *disturb* it; and the *Earth* by means of it. And therefore they also gave him the Name of $\text{Ἀσφαλ}\chi\theta$, or *The Establisher*; under

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under which Name several *Temples* were consecrated to him, and *Sacrifices* offer'd, whenever an *Earthquake* happened, to pacify and appease him ; requesting that he would allay the *Commotions* of the *Water*, secure the *Foundations* of the *Earth*, and put an End to the *Earthquake*.

That the *Fire*, it self, which, being thus *assembled* and *pent up*, is the *Cause* of all these *Perturbations*, makes its *own Way* also forth, by what *Passages* soever it can get vent : through the *Spiracles* of the next *Volcano** : through the *Cracks* and *Openings* of the *Earth* above-mentioned : through the *Apertures* of *Springs*, especially those of the *Therma** : or any other *Way* that it can either find or maké. And being thus *discharged*, the *Earthquake* ceaseth, till the *Cause* returns again, and a fresh Collection of this *Fire* committs the same *Outrages* as before.

* Confer
Con/. 13.
infra.

* Vid.
Consect. 14.
infra.

That there is sometimes in *Commotion* a *Portion* of the *Abyss* of that *vast Extent*, as to shake the *Earth* incumbent upon it for so very large a *Part* of the *Globe* together,

that the *Shock* is felt the *same Minute* precisely in *Countrys* that are many hundreds of *Miles* distant from each other : and this even though they happen to be parted by the *Sea* lying betwixt them. Nay, there want not Instances of such an universal *Concussion* of the *whole Globe* as must needs imply an Agitation of the *whole Abyss*.

That though the *Abyss* be liable to these *Commotions* in *all Parts* of it, and therefore no *Country* can be wholly exempted from the *Effects* of them, yet these *Effects* are nowhere very remarkable, nor are there usually any great *Damages* done by *Earthquakes*, except only in those *Countrys* which are *mountainous*, and consequently *stoney*, and *cavernous* underneath* : and especially where the *Disposition* of the *Strata* is such that those *Caverns* open into the *Abyss*, and so freely admitt and entertain the *Fire*, which, assembling therein, is the *Cause* of the *Shock* ; it naturally steering its Course *that Way* where it finds the readiest *Reception*, which is towards these *Caverns* ; this being indeed much

* Vid.
Part 2.
Consect. 8.

much the Case of *Damps* in *Mines*, whereof more by and by. Besides that those Parts of the Earth which abound with *Strata* of *Stone*, or *Marble*, making the strongest *Opposition* to this *Effort*, are the most furiously *shatter'd*, and suffer much more by it than those which consist of *Gravel*, *Sand*, and the like *laxer Matter*, which more easily *give way*, and make not so great *Resistance*; an *Event* observable not only in this, but all other *Explosions* whatever. But, above all, those *Countrys*, which yield great Store of *Sulphur* and *Nitre*, are by far the most *injured* and *incommoded* by *Earthquakes*; these *Minerals* constituting in the *Earth* a kind of *Natural Gunpowder*, which, taking *fire*, upon this *assembly* and *approach* of it, occasions that murmuring *Noise*, that *subterranean Thunder*, if I may so speak, which is heard rumbling in the *Bowels* of the *Earth* during *Earthquakes*, and, by the Assistance of its *explosive Power*, renders the *Shock* much *greater*, so as sometimes to make miserable *Havock* and *Destruction*. And 'tis for this Reason that *Italy*, *Sicily*, *Anatolia*,

Anatolia, and some Parts of *Greece*, have been so long and so often alarmed and harrassed by *Earthquakes*; these Countreys being all *Mountainous* and *Cavernous*, abounding with *Stone* and *Marble*, and affording *Sulphur* and *Nitre* in great *Plenty*. But for a more particular *History* of the several *Phænomena* which precede, which accompany, and which follow after *Earthquakes*: for the *Causes* of those *Phænomena*: and for a more exact *Account* of the *Origine*, and the *Oeconomy* of this *subterranean Fire*, I must beg the Reader's *Patience* 'till the larger *Work* be made publick.

13. That *Ætna*, *Vesuvius*, *Hecla*, and the other *Volcanoes*, are only so many *Spiracles*, serving for the *Discharge* of this *subterranean Fire*, when 'tis thus preternaturally assembled. That where there happens to be such a *Structure* and *Conformation* of the *interiour Parts* of the *Earth* that the *Fire* may pass, freely and without *Impediment*, from the *Caverns*, wherein it *assembles*, unto these *Spiracles*, it then readily and easily gets out, from Time to Time,

Time, without *shaking* or *disturbing* the *Earth*. But where such *Communication* is wanting, or the *Passages* not sufficiently *large* and *open*, so that it cannot come at the said *Spiracles* without first *forcing* and *removing* all *Obstacles*, it *heaves* up and *shocks* the *Earth*, with greater or lesser *Impetuosity*, according as the *Quantity* of the *Fire* thus assembled is greater or less, till it hath made its *Way* to the *Mouth* of the *Volcano*; where it rusheth forth, sometimes in mighty *Flames*, with great *Velocity*, and a terrible bellowing *Noise*. That therefore there are scarcely any *Countrys*, that are much *annoyed* with *Earthquakes*, that have not one of these *Firey Vents*. And *these* are constantly all in *Flames* whenever any *Earthquake* happens; they *disgorge* that *Fire*, which, whilst *underneath*, was the *Cause* of the *Disaster*. Indeed, were it not for these *Diverticula*, whereby it thus gains an *Exit*, 'twould *rage* in the *Bowels* of the *Earth* much more *furiously*, and make greater *Havock* than now it doth. So that though *those Countrys*,

tries, where there are such *Volcanoes*, are usually, more or less, troubled with *Earthquakes*; yet, were these *Volcanoes* wanting, they would be much more *annoy'd* with *them* than now they are; yea in all probability to that *Degree*, as to render the Earth, for a vast Space round them, perfectly *uninhabitable*. In one Word, so beneficial are *these* to the *Territories* where they are, that there do not want *Instances* of *some* which have been *rescu'd* and wholly *deliver'd* from *Earthquakes* by the breaking forth of a new *Volcano* there; this continually *discharging* that *Matter*, which, being till then *barricaded* up, and *imprisoned* in the *Bowels* of the *Earth*, was the Occasion of very great and frequent *Calamities*. That most of these *Spiracles* perpetually and at *all Seasons* send forth *Fire*, more or less: and though it be sometimes so little that the Eye cannot discern it, yet even then, by a nearer Approach of the Body, may be discovered a copious and very sensible *Heat* continually issuing out.

That

That the *Therma*, *Natural Baths*, 14.
 or *Hot-Springs*, do not owe their
Heat to any *Colluctation* or *Effervescence*
 of the *Minerals* in them, as
 some *Naturalists* have believ'd: but
 to the beforemention'd *Subterranean*
Heat or *Fire*. That these *Baths*
 continually *emitt* a *manifest* and very
sensible Heat: nay some of them
 have been observed at some *Times*
 to send forth an *actual* and *visible*
Flame. That not only *these*, but all
 other *Springs* whatever, have in
 them some *Degree of Heat**, (none
 of them ever *Freezing*, no not in
 the longest and severest *Frosts*) but
 more especialy those which arise
 where there is such a *Site* and *Dis-*
position of the *Strata* within the
Earth as gives free, and easy *Ad-*
mission to this *Heat*, and favours its
Ascent to the *Surface*; where, *per-*
spiring forth at the same *Outlets* with
 the *Water* of the *Spring*, it by that
 Means *beats* it, more or less, as it
 chanceth to be dispensed forth in
 greater or lesser *Quantity*. That as
 the *Heat* of *all Springs* is owing to
 this *subterraneous Fire*, so wherever
 there are any *extraordinary Dischar-*
ges

* It is
indeed by
this very
Heat that
their *Wa-*
ter is born
unto them
from out
the *Abyss*.
Vid. Conf.
8. *supra*.

ges of *this Fire*, there also are the neighbouring Springs *botter* than ordinary; witness the many *Hot-Springs* near *Ætna*, *Vesuvius*, *Hecla*, and all other *Volcanoes*. That the *Heat* of the *Therma* is not *constant*, and always *alike*; the *same Spring* suffering at some Times a very manifest *Failure* and *Remission* of its *Heat*: at others as manifest an *Addition* and *Encrease* of it; yea sometimes to that *Excess* as to make it *boil* and *bubble* with *extream Heat*, like *Water* when boiling over a *common Fire*. That particularly during *Earthquakes*, and *Eruptions* of *Volcanoes**, when there is a more copious *Accession* of this *subterraneous Fire*, the *Therma* all thereabouts become much *botter* than before; yielding also a far *greater Supply* of *Water* than they were wont to do: and a *murimuring Noise* is usually heard, below them, in the *Bowels* of the *Earth*. All which is occasioned meerly by the then rapid *Motion*, and *Ascent* of the *Fire*, in greater *Plenty* than before, to the *Apertures* of these *Springs*.

* *Vid.*
Conf. 12.
and 13.
supra.

I have

I have now finish'd the Account of *this Section* : and was just going to take off my Hand here. But recollecting that, in the foregoing Part of this Work*, I promised some further *Proofs* of *Contrivance* in the *Structure* of the *Globe* we dwell upon : and such too as may satisfy any fair and unbiass'd Spectator that the *Frameing* and *Composition* of it out of the *Materials* of the former *Earth* was a *Work* of *Counsel* and *Sagacity* : a *Work* apparently above the highest *Reaches* of *Chance*, or the *Powers* of *Nature* ; and *this* being a proper Place wherein to produce those *Proofs*, I shall give such *Hints* of them as the *Brevity* I am tyed up to will permitt me, and then conclude.

I am indeed well aware that the Author of the *Theory of the Earth** differs very much from me in Opinion as to this Matter. He will not allow that there are any such Signs of Art and Skill in the Make of the present *Globe* as are here mention'd : or that there was so great Care, and such exact Measures taken in the re-fitting of it up again
at

* Lib. 1.
Cap. 9. 10
12.

at the Deluge. He reckons it no other than an huge disorderly Pile of *Ruines and Rubbish*: and is very unwilling to believe that it was the Product of any Reasoning or Designing Agent. The Chanel of the Ocean appears to him *the most ghastly Thing in Nature*, and he cannot at all admire its *Beauty or Elegancy*: for 'tis, in his judgment, *as deformed and irregular as it is great*. And for the Caverns of the Earth, the Fissures and Breaches of the *Strata*, he cannot fancy that they were formed by any *Work of Nature*, nor by any *immediate Action of God*, seeing there is neither *Use*, that he can discover, nor *Beauty in this Kind of Construction*. Then for the Mountains, these, he says, are placed in no Order one with another, that can either respect *Use or Beauty*, and do not consist of any *Proportion of Parts* that is referable to any *Design*, or that hath the least *Footsteps of Art or Counsel*. In fine, he thinks there are several Things in the *Terraqueous Globe* that are *rude and unseemly*: and many that are *superfluous*. He looks upon it as *incommodious*, and
as

as a broken and confused Heap of
Badges, placed in no Order to one an-
other, nor with any Correspondency or
Regularity of Parts: and it seems, to
him, nothing better than a rude
Lump, and a little dirty Planet. I
have given his Opinion in his own
Words, though I have upon all
like Occasions taken a shorter Course,
and contented my self with giving
only the Sense of Others; but this
I have done, here, least any Man
should suspect that I mistake the
Author's Sentiments, or do not re-
present them fairly.

Now though it were really so,
that there were some such Eye-
Sores in our *Earth* as are here sug-
gested: and that we could not pre-
sently find out all the Gayeties and
Embellishments that we might seek
for in it, the Matter would not be
great: and we might very well be
contented to take it as we find it.
But after all, the Thing is quite
otherwise, and there are none of
all these wanting: nor any such
Deformities as are here imagined;
but, on the contrary, so very many
real Graces and *Beauties*, that 'tis

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no easy Thing to overlook them all. Even this very Variety of *Sea* and *Land*, of *Hill* and *Dale*, which is here reputed so inelegant and unbecoming, is indeed extremely charming and agreeable. Nor do I offer this as any private Fancy of my own, but as the *common Sense* of *Mankind*, who are the true and proper Judges in the Case; both the *Antients* and *Moderns*, giving their Suffrages unanimously herein. Even the very *Heathens* themselves, have esteemed this *Variety* not only *ornamental* to the Earth, but a *Proof* of the *Wisdom* of the *Creator* of it, and *alleged* it as such; whereof more in due Place.

And, as I cannot admitt that there is any thing *unhandsome* or *irregular*: so much less can I grant that there is any thing *incommodious* and *Artless*, or *useless* and *superfluous*, in the *Globe*. Were I at full Liberty to do it here, 'twould be no hard thing to make appear that there are no real Grounds for any such *Charge*. For how easy were it, by taking a minute and distinct Survey of the *Globe*, and of the very many and
various

various *Limbs*, and *Parts* of it, to shew that all these are order'd and digested with infinite *Exactness* and *Artifice*; each in such Manner as may best serve to its own proper *End*, and to the *Use* of the *whole*? How easy were it to shew, that the *Rocks*, the *Mountains*, and the *Caverns*, against which these *Exceptions* are made, are of indispensable *Use* and *Necessity*, as well to the *Earth* as to *Man* and other *Animals*, and even to all the rest of its *Productions*? that there are no such *Blemishes*, no *Defects*: nothing that might have been *alter'd* for the *better*: nothing *superfluous*: nothing *useless*, in all the whole Composition? and so finally trace out the numerous *Foot-steps* and *Marks* of the *Presence* and *Interposition* of a most wise and intelligent *Architect* throughout all this really wonderfull *Fabrick*? But I must reserve *this* for a fitter Opportunity, and content my self for the present with only giving some brief Intimations of it in the following *Propositions*. Namely,

That 'twas absolutely necessary for the *well being* both of the *Earth*

it self, and of all *Terrestrial Bodies*, that some of the *Strata* should *consolidate*, as they did, immediately after the *Subsidence* of their Matter at the *Deluge*: that *these* should afterwards be *broken* in certain Places: and lastly, that they should be *dislocated*, some of them *elevated*, and others *depressed*.

That had not the *Strata* of Stone and Marble become *solid**, but the
 •As Pt. 2. Sand, or other Matter whereof
 Consect. 4. they consist, continued *lax* and *incoherent*, and they consequently been as *pervious* as those of Marle, Gravel, and the like, the *Water* which rises out of the *Abyss*, for the Supply of *Springs* and *Rivers*, would not have *stop'd* at the *Surface* of the *Earth*, but *march'd* directly, and without Impediment, up into the *Atmosphere*, in all Parts of the *Globe*, wherever there was *Heat* enough in the *Air* to continue its *Ascent*, and buoy it up. So that there then must needs have been an universal *failure* and *want* of *Springs* and *Rivers* all the *Summer-Season*, in the *colder Climes*: and all the *Tear* round in the *hotter*, and those that are

near

near the *Aequator*, where there is much the greatest need of both the one and the other; and this meerly for want of the Interposition of such *dense* and *solid Strata*, to arrest the ascending *Vapour*, to stop it at the *Surface* of the *Earth*: and to collect and condense it there.

That though the *Strata* had become solid, so as to have condensed the rising *Vapour*, yet if they had not been broken also*, the *Water* must have lain eternally underneath those *Strata*, without ever coming forth. And consequently there then could have been neither *Springs* nor *Rivers* for a very considerable Part, or indeed, almost the whole *Earth*; the *Water*, which supplies these, proceeding out at those *Breaches**. This *Water* therefore would have been wholly intercepted, all lock'd up within the *Earth*, and its Egress utterly debarr'd, had the *Strata* of *Stone* and *Marble* remained continuous, and without such *Fissures* and *Interruptions*. That these *Fissures* have a still further Use, and serve for *Receptacles* of *Metalls*, and of several Sorts of *Minerals*;

which are *arrested* by the *Water* in its *Passage* thither thro' the *Strata* wherein the single *Corpuscles* of those *Metalls* and *Minerals* were lodg'd*: and *borne* along with it into these *Fissures*; where, being by this Means *collected*, they are kept in Store for the *Use* of *Mankind*.

• Part 4.
Confett. 5.

That though there had been both *solid Strata* to have *condens'd* the ascending *Vapour*: and *those* so *broken* too as to have given free *Vent* and *Issue* to the *Water* so *condens'd*; yet had not the said *Strata* been *dislocated* likewise*, some of them *elevated*, and others *depress'd*, there would have been no *Cavity* or *Channel* to give Reception to the *Water* of the *Sea*: no *Rocks*, *Mountains*, or other *Inequalities* in the *Globe*. And without *these*, the *Water*, which now *arises* out of it, must have all *stagnated* at the *Surface*, and could never possibly have been *refunded* forth upon the *Earth*: nor would there have been any *Rivers*, or *running Streams*, upon the Face of the *whole Globe*, had not the *Strata* been thus *raised up*, and the *Hills* *exalted* above the neighbouring *Valleys*

• Part 2.
Conf. 6, 7,
8.

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leys and Plains ; whereby the *Heads* and *Sources* of *Rivers*, which are in those *Hills*, were also *borne up* above the ordinary *Level* of the *Earth*, so that they may *flow* upon a *Descent*, or an *inclining Plane*, without which they could not *flow* at all*. * Confer

That this *Affair* was not transacted unadvisedly, casually, or at random ; but with due *Conduct*, and just *Measures*. That the *Quantity* of *Matter* consolidated : the *Number*, *Capacity*, and *Distances* of the *Fissures* : the *Situation*, *Magnitude*, and *Number* of the *Hills*, for the condensing, and discharging forth the *Water* : and, in a Word, all other Things were so order'd that they might *best* conduce to the *End* whereunto they were *design'd* and *ordain'd*. There was such *Provision* made, that a *Country* should not want so many *Springs* and *Rivers* as were *convenient* and *requisite* for it : nor, on the other Hand, be *over-run* with them, and afford little or nothing else ; but that there should be a *Supply* every where ready, *suitable* to the *Necessities* and *Expences* of each *Climate* and *Region* of the

Consect. 8.
supra.

Globe. For Example; those *Countries* which lye in the *Torrid Zone*, and under or near the *Line*, where the *Heat* is very great, are furnish'd with *Mountains* answerable: *Mountains* which both for *Bigness* and *Number* surpass those of *colder Countries* as much as the *Heat* there surpasses that of *those Countries*. Witness the *Andes*, that prodigious Chain of *Mountains* in *South America*: *Atlas* in *Africa*: *Taurus* in *Asia*: the *Alpes* and *Pyrenees* of *Europe*, to mention no more. By these is collected and dispensed forth a Quantity of *Water* proportionable to the *Heat* of *those Parts*. So that although, by reason of the *Excess* of this *Heat* there, the *Evaporations* from the *Springs* and *Rivers* are very great; yet they, being, by these larger *Supplies*, continually stock'd with an *Excess* of *Water* as great, yield a Mass of it for the Use of *Mankind*, the *Inhabitants* of *those Parts*, of the other *Animals*, and of *Vegetables*, not much, if at all, inferiour to the *Springs* and *Rivers* of *colder Climates*. That, besides this, the *Waters* thus evaporated and mount-
ed

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ed up into the Air, *thicken* and *cool* it, and, by their *Interposition* betwixt the *Earth*, and the *Sun*, *screen* and *fence off* the *ardent Heat* of it, which would be otherwise *unsupportable*: and are at last returned down again in copious and fruitful *Showers* to the *scorched Earth*; which, were it not for this remarkably *Providential Contrivance* of Things, would have been *there* perfectly *uninhabitable*: laboured under an eternal *Drought*: and have been continually *parched* and *burnt*.

To this former Section I shall add, by way of Appendix,

A Dissertation concerning the *Flux and Reflux of the Sea*: and its other *Natural Motions*; with an Account of the *Cause* of those *Motions*: as also of the *End* and *Use* of them: and an Enquiry touching the *Cause* of the *Ebbing* and *Flowing*, and some other uncommon *Phænomena* of certain *Springs*. 1.

A Discourse concerning the *Saltiness of the Sea*. 2.

A Discourse concerning *Wind*: the *Origin*, and *Use* of it in the *Natural World*. 3.

SECT.



S E C T. II.

*Of the Universality of
the Deluge. Of the Water
which effected it. Together
with some further Particulars
concerning it.*

IN the precedent Section I consider the *present* and *natural State* of the *Fluids* of the *Globe*. I ransack the several Caverns of the *Earth*: and search into the Storehouses of *Water*; and this principally in order to find out where that mighty *Mass* of *Water*, which *overflow'd* the *whole Earth* in the Days of *Noah*, is *now* bestow'd and conceal'd: as also which Way 'tis at *this Time* useful to the *Earth* and its *Productions*, and serviceable to the *present Purposes* of Almighty *Providence*.

Such a *Deluge* as that which *Moses* represents, whereby *All the high Hills*

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*Hills that were under the whole Heaven were cover'd**, would require a portentous Quantity of Water : and Men of Curiosity, in all Ages, have been very much to seek what was become of it, or where it could every find a *Reservatory* capable of containing it. 'Tis true there have been several who have gone about to inform them, and set them to rights in this Matter ; but for want of that Knowledge of the *present System of Nature* : and that Insight into the *Structure and Constitution* of the *Terraqueous Globe*, which was necessary for such an Undertaking, they have not given the Satisfaction that was expected. So far from it that the *greatest Part* of these, seeing no where Water enough to effect a *General Deluge*, were forc'd at last to mince the Matter, and make only a *Partial* one of it ; restraining it to one *single Country* : to *Asia*, or some lesser Portion of Land ; than which, nothing can be more contrary to the *Mosaick Narrative*.

For *the rest*, they had Recourse to *Shifts* which were not much better : and rather evaded than solved the
Difficulty ;

* Gen. vii.

19.

Difficulty; some of them imagining that a Quantity of Water, sufficient to make such a *Deluge*, was *created* upon that Occasion: and, when the Business was done, all disbanded again and *annihilated*. Others supposed a *Conversion* of the *Air* and *Atmosphere* into *Water*, to serve the turn. Many of them were for fetching down I know not what *super-cæstrial Waters* for the Purpose. Others concluded that the *Deluge* rose only *fifteen Cubits* above the *Level* of the Earth's ordinary *Surface*, covering the *Valleys* and *Plains*, but not the *Mountains*; all equally wide of *Truth*, and of the Mind of the *Sacred Writer*.

One of the last *Undertakers* of all, seeing this, began to think the *Cause* desperate: and therefore, in Effect, gives it up. For, considering how unsuccessful the Attempts of those who were gone before him had proved: and having himself* also employ'd his last and utmost Endeavours to find out *Waters* for the vulgar *Deluge*: having muster'd up all the Forces he could think of, and all too little: *the Clouds above, and the*

*Theory of
the Earth,
l. 1. c. 2.

*the Deep*s below, and in the Bowels of the Earth; and these, says he, are all the Stores we have for Water, and Moses directs us to no other for the Causes of the Deluge; He prepares for a Surrender, asserting, from a mistaken and defective Computation, that all these will not come up to near the Quantity requisite: and that in any known Parts of the Universe, to find Water sufficient for this Effect; as it is generally explained and understood, is, he thinks, impossible: that is, sufficient to cause a Deluge, to use his own Words, overflowing the whole Earth, the whole Circuit, and whole Extent of it, burying all in Water, even the greatest Mountains, which is, in plain Terms, such a one as was explain'd and understood by Moses, and the Generality of Writers since.

Having therefore thus over-hastily concluded that such a Deluge was impossible, and that all Nature could not afford Water enough to drown the whole Globe, if of the Circuit and Extent that now it is; he flies to a new Expedient to solve the Matter, and supposes an Earth of a
Make

Make and *Frame* much like that imaginary one of the famous Monfieur *Des Cartes**; which he fancies to fall all to Pieces; at the *Deluge*, and to contract it self into a lesser Room, that a less Quantity of Water might surround and encompass it.

* *Princ. Philof.* L. 4.

The sober and better Sort of the Standers-by, and those who were Well-wishers to *Moses*, began to be under some Concern and Uneasiness to see him thus set aside only to make Way for a new *Hypothesis*: and so serious and weighty a Matter, as is this *Relation* of the *Universal Deluge*, plac'd after all upon so unsteady a Bottom. But that Concern encreas'd when they further heard him so zealously decrying all former *Notions* of a *Deluge*: refusing to grant one upon any *Terms* but his own: and so peremptorily declaring, *That all other Ways assign'd for the Explication of Noah's Flood are false or impossible*. This was to reduce the Thing to a very great *Straight*: and surely an exposing and venturing of it a little too far. For, if all the other *Ways* be false

false and impossible, should this, the only one left, prove at last so likewise, the Opinion of a Deluge would be left very precarious and defenseless: and we might either believe or disbelieve it at Pleasure. Nay the negative Part would, of the two, have much the Advantage; there being no reasonable Foundation to believe that the Deluge did come to pass this Way.

Some Men there are who have made a very untoward Use of *this*: and such a one as I am willing to persuade my self he never intended they should; yet it were to have been wish'd that he had been somewhat more wary. These cry'd up his *Computation* of the *Water* as indisputable and infallible: and then boldly gave out that such a *Deluge* as that described by *Moses* was altogether incredible, and that there never was nor could be any such Thing. Nothing was talk'd of amongst them under Mathematical Demonstrations of the *Falseness* of it; which they vented with all imaginable Triumph, and would needs have it that they had here sprung

spring a fresh and unanswerable Argument against the *Authentickness* of the *Mosaic Writings*; which indeed is what they drive at, and a Point they very vain would gain.

For my Part, my *Subject* does not necessarily oblige me to look after this *Water*: or to point forth the Place wherunto 'tis now retreated. For, when, from the *Sea-Shells*, and other *Remains* of the *Deluge*, I shall have given undeniable *Evidence* that it did actually cover all *Parts* of the *Earth*, it must needs follow that there was then *Water enough* to do it, wherever it may be now hid, or whether it be still in being or not. Yet the more effectually to put a Stop to the *Insults* and *Derisions* of these vain *Men*, I resolved to enter a little farther into the Examination of this Matter. Which produced the former Section of this 3d Part, wherein I enquire what *Proportion* the *Water* of the *Globe* bears to the *Earthly Matter* of it. And upon a moderate *Estimate* and *Calculation* of the *Quantity* of *Water* now actually contain'd in the *Abyss*, I found that this alone was more than
enough.

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enough, if brought out upon the Surface of the Earth, to cover the whole Globe to the Height assign'd by Moses; which is fifteen Cubits above the Tops of the highest Mountains*. The Particulars of which Calculation, shall be laid before the Reader at Length in the Larger Work. For any one will easily see that there is so great an Apparatus of Things, only previous, which must needs be adjusted before I can come to the Calculation it self, that to descend to Particulars here, further than I have already* done, would not only carry this Discourse out beyond all reasonable Bounds, and make the Parts of it disproportionate to each other, but, which is not less to be thought of, would be an Anticipation of the Other Work.

* Gen. vii. 20.

* Confer Sect. 1. Conf. 12.

This done, I again set aside the Observations about the Fluids of the Globe, introduced upon this Occasion in the other Section, as now of no farther Use: and reassume the Thread of the other Observations which I propose at the Beginning of this Work: and from them I shew,

N

That.

1. That the *Deluge* was *Universal*, and laid the *whole Earth* under *Water*; covering all, even the *highest Mountains*, quite round the *Globe*.

2. That, at the Time of the *Deluge*, the *Water* of the *Ocean* was *first* born forth upon the *Earth*: that it was immediately succeeded by *that* of the *Abyss*; which likewise was brought out upon the *Surface* of the *Globe*.

3. That upon the *Disruption* of the *Strata*: and the *Elevation* of some, and *Depression* of others of them, which follow'd after that *Disruption*, towards the latter End of the *Deluge*^{*}, this Mass of *Water* fell back again into the *deprest* and *lower Parts* of the *Earth*: into *Lakes* and other *Cavities*: into the *Alveus* of the *Ocean*: and, through the *Fissures* whereby *this* communicates with the *Ocean*^{*}, into the *Abyss*; which it filled till it came to an *Equilibrium* with the *Ocean*.

* Part 2.
Consect. 6.

* Sect. 1.
supra.
Consect. 2.

4. That there must have pass'd a considerable Number of *Years* betwixt the *Creation* and the *Deluge*: and most probably about so many as *Moses* hath assign'd.

That

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That the *Deluge* commenc'd in the *Spring-season* ; the *Water* coming forth upon the Earth in the *Month* which we call *May**.

5.
* Confer
p. 81, 82
supra : 3
Part 6.
sub finem.
6.

That not only *Men*, *Quadrupeds*, *Birds*, *Serpents*, and *Insects*, the Inhabitants of the Earth and Air : but the far *greatest Part* of all Kinds of *Fish* likewise, the Inhabitants of the Sea, of Lakes, and of Rivers, *suffer'd* under the Fury of the *Deluge*, and were *kill'd* and *destroy'd* by it.

That the *Deluge* did not happen from an accidental Concourse of *Natural Causes*, as the *Author* above-cited is of Opinion*. That very many *Things* were then certainly done, which never possibly could have been done without the Assistance of a *Supernatural Power*. That the said *Power* acted in this Matter with *Design*, and with the highest *Wisdom*. And that, as the *System* of *Nature* was *then*, and is *still* supported and establish'd, a *Deluge* neither could *then*, nor can *now*, happen *naturally*.

7.
* Theory of
the Earth.
l. i. c. 6, 8,
&c.

I close up this Section with *two additional Discourses*,

N 2

The

The first concerning the *Migration of Nations*; with the several *Steps* whereby the *World* was re-peopled after the *Deluge* by the *Posterity* of *Noah*, and particularly that mighty Tract of *America*. Wherein I shall make out, 1. *Who* they were that first peopled it. 2. *When* they departed thitherwards. 3. *What Course* they took: and by *what Means* both *Men* and *Beasts*, as well as *Serpents* and the other noxious and more intractable Kinds of them, as the more innocent and useful, got thither. 4. Whether there remain any certain *Vestigia* of a *Tradition*, in the *Writings* of the *Antients*, about these *Americans*: and what Country they intended under the Name of *Atlantis*. 5. Whether the *Phœnicians*, or any other Nation of the *old World*, maintained antiently any *Commerce* or *Correspondence* with them. 6. How it happen'd that both the *Inhabitants* of *that*, and of *our World*, lost all *Memory* of their *Commigration* hence. 7. Whence came the *Difference* in *Person*, or in the external *Shape* and *Lineaments* of the *Body*: in *Language*: in *Dyet*,
and

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Manner of *Living* : in *Clothing* : in *Arts* and *Sciences* : in *Customs*, Religious, Civil, and Military, betwixt these *Americans*, and their old Relations in *Asia*, *Europe*, and *Africa*. With Animadversions on the Writings of *Grotius*, *De Laet*, *Hornius*, and others, upon this Subject.

The Second concerning the unanimous Tradition of an Universal Deluge amongst all the most antient Gentil Nations ; particularly the Scythians, the Persians, the Babylonians : the Bithynians, Phrygians, Lydians, Cilicians, and other People of Asia Minor : the Hierapolitans, Phanicians, and other Inhabitants of Syria : the Egyptians, Carthaginians, and other African Nations : the most antient Inhabitants of the several Parts of Greece : and of the other Countryes of Europe : the old Germans : the Gauls : the Romans : the antient Inhabitants of Spain : and even the Britains themselves, the first Inhabiters of this Island ; proving that the great Devastation and Havock the Deluge made, both of the Earth it self, of the Generality of Mankind, of Brutes,



PART IV.

Of the Origin and Formation of Metalls and Minerals.

W H A T I can advance, with competent Certainty, about the *Fluids* of the *Globe*, the *Sea*, *Springs*, *Rivers*, and *Rain*, I propose in the immediately foregoing or *Third Part* of this *Essay*. As in the *Second Part* of it I dispatch the *Solids*; *Stone*, *Marble*, *Clay*, and all the other *Terrestrial Matter* of it, which is digested into *Strata*. That *Part* therefore comprehends the far greater Share of that *Matter*: and indeed all, excepting only *Metalls* and *Minerals*; which are found much more sparingly, and in lesser *Parcels*; being either enclosed in those *Strata* (lying amongst

amongst the Sand, Earth, or other Matter whereof they consist) or contain'd in their *perpendicular Figures*. And *these* remaining still to be consider'd, I have allotted this *Fourth Part* to that Purpose.

To write of *Metalls* and *Minerals* intelligibly and with tolerable Per-spiciuity, is a Task much more difficult than to write of either *Animals* or *Vegetables*. For those carry along with them such plain and evident *Notes* and *Characters* either of Disagreement, or Affinity with one another, that the several *Kinds* of them, and the subordinate *Species* of each, are easily known and distinguish'd, even at first Sight; the Eye alone being fully capable of judging and determining their mutual *Relations*, as well as their *Differences*.

But in the *Mineral Kingdom* the Matter is quite otherwise. Here is nothing *regular*, whatever some may have pretended: nothing *constant* or *certain*. Insomuch that a Man had need to have all his Senses about him: to use repeated Tryals and Inspections, and that with all

all imaginable Care and Waryness, truly and rightly to discern and distinguish Things, and all little enough. Here are such a vast Variety of *Phænomena* : and those, many of them, so delusive, that 'tis very hard to escape Imposition and Mistake. Colour, or outward Appearance, is not at all to be trusted. A common *Marcasite* or *Pyrites* shall have the Colour of *Gold* most exactly : and shine with all the Brightness of it ; and yet, upon Tryal, after all, yield nothing of Worth, but *Vitriol*, and a little *Sulphur* ; whilst another Body, that hath only the Resemblance of an ordinary *Pebble*, shall yield a considerable Quantity of *Metallick* and valuable Matter. So likewise a Mass, which, to the Eye, appears to be nothing but meer simple *Earth*, shall, to the Smell or Taste, discover a plentiful Admixture of *Sulphur*, *Alum*, or some other *Mineral*.

Nor may we with much better Security rely upon *Figure*, or external *Form*. Nothing more uncertain and varying. 'Tis usual to meet with the very same *Metal*, or
Mineral,

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Mineral, naturally shot into quite different *Figures* : as 'tis to find quite different *Kinds* of them all of the same *Figure*. And a Body that has the Shape and Appearance of a *Diamond*, may prove, upon Examination, to be nothing but *Crystall*, or *Selenites* : nay perhaps only common *Salt*, or *Alum*, naturally crystalliz'd and shot into that *Form*.

So likewise if we look into their *Situation*, and *Place* in the Earth ; sometimes we find them in the *perpendicular Intervalls* : sometimes in the *Bodies* of the *Strata*, being interspers'd amongst the *Matter* whereof they consist : and sometimes in both. Even, if I may so speak, the *gemmeous Matter* it self ; with this only Difference, that those *Gemms*, e. g. Topazes, Amethyfts, or Emeralds, which grow in the *Fiffures*, are ordinarily *crystalliz'd*, or shot into *angulated Figures* : whereas, in the *Strata*, they are found in *rude Lumps*, and only like so many yellow, purple, and green *Pebles*. Not but that even these, that are thus lodg'd in the *Strata*, are also sometimes

* Vid.
Confect. 2.
infra.

times found *crystalliz'd*†, and in Form of *Cubes*, *Rhombs*, and the like*. Or if we have respect to the *Terrestrial Matter* wherein they lye in those *Strata*, here we shall meet with the same *Metall* or *Mineral* embody'd in *Stone*, or lodg'd in *Cole*, that elsewhere we found in *Marle*, in *Clay*, or in *Chalk**.

* Vid.
Confect. 3.
infra.

As much Inconstancy and *Confusion* is there in their *Mixtures* with each other, or their *Combinations* amongst themselves. For 'tis rare to find any of them *pure*, *simple*, and *unmixt* ;

† The *Crystallized Bodies* found in the *perpendicular Intervalls* are easily known from those which are lodged in the *Strata*, even by one who did not take them thence, or observe them there. The former have always their *Root*, as the Jewellers call it ; which is only the *Abruptness* at that *End* of the Body whereby it adhered to the *Stone*, or *Sides* of the *Intervalls* ; which *Abruptness* is caused by its being broke off from the said *Stone*. Those which are found in the *Strata* of *Earth*, *Sand*, or the like, (having lain loose therein) are *intire*, and want that Mark of *Adhesion*. But those which are *inclosed* in *Stone*, *Marble*, or such other *solid Matter*, being difficultly separable from it, because of its *Adhesion* to all *Sides* of them, have commonly some of that Matter still adhering to them, or at least Marks of its having been broke from them, on all their *Sides* ; wherein these differ from those found in the *perpendicular Intervalls*, they adhering, as we have noted, by only one *End*.
Vid. Conf. 6. &c. infra.

unmixt; but Copper and Iron together in the *same Mass*: Copper and Gold: Silver and Lead: Tin and Lead: yea sometimes all the six *promiscuously* in *one Lump*. 'Tis the same also in *Minerals*; Nitre with Vitriol: Common Salt with Alum: Antimony with Sulphur: and sometimes all these together. Nor do *Metalls* only sort and herd with *Metalls* in the Earth: and *Minerals* with *Minerals*; but *both* indifferently and in common *together*. Lead, with Spar, with Calamin, or with Antimony: Iron with Vitriol, with Alum, with Sulphur: Copper with Sulphur, with Vitriol, &c. yea Iron, Copper, Lead, Nitre, Sulphur, Vitriol, and perhaps some more, in one and the *same Mass*. In a Word, the only standing *Test*, and discriminative *Characteristick* of any *Metal* or *Mineral* must be sought for in the *constituent Matter* of it: and it must be first brought down to *that* before any certain *Judgment* can be given. And when that is once done, and the several *Kinds* separated and extracted each from the other, an homogeneous *Mass* of
one

one Kind is easily distinguishable from any other : Gold from Iron : Sulphur from Nitre : and so of the rest. But, without *this*, so various are their *Intermixtures*, and so *different* the *Face* and *Appearance* of each, because of that *Variety*, that scarcely any thing can be certainly determin'd of the particular *Contents* of any single *Mass* of *Ore* by meer *Inspection*. I know that by *Experience* and *Conversation* with these *Bodies*, in any *Place* or *Mine*, a Man may be enabled to give a near Conjecture at the *Metallick* or *Mineral Ingredients* of any *Mass* commonly found there ; but this meerly because he hath before made Tryal of *other like Masses*, and thereby learned what it is they contain. But, if he remove to *another Place*, tho' perhaps very little distant, 'tis ten to one but he meets with so different a *Face* of *Things*, that he'll be there as far to seek in his *Conjectures* as one who never before saw a *native Ore* ; untill he hath here made his *Tryals* as before, and so further inform'd himself of the Matter.

Metalls

Metalls being so very useful and serviceable to *Mankind*, great Care and Pains hath been taken, in all Ages, in *Searching* after them, and in *Separating* and *Refining* of them. For which Reason 'tis that *these* have been accurately enough *distinguish'd* and reduced to *six Kinds*; which are all well enough known. But the like Pains hath not been taken in *Minerals*; and therefore the Knowledge of *them* is somewhat more confused and obscure. *These* have not yet been well reduced, or the *Number* of the *simple original* ones rightly fixt; *some*, which are only *Compounds*, the Matter of two or more *Kinds* being *mix'd* together, and, by the different *Proportion* and *Modulation* of that Matter, variously *disguis'd* and *diversify'd*, having been reputed all *different Kinds* of *Minerals*, and thereby the *Number* of them unnecessarily *multiply'd*. Of this we have an *Instance* in the *Gemm-kind*; where, of all the *many Sorts* reckon'd up by *Lapidaries*, there are not above *three* or *four* that are *Originals*; their *Diversities*, as to *Lustre*, *Colour*, and *Hardness*, arising.

rising from the different *Admixture* of other *adventitious Metallick* and *Mineral Matter*. But the farther and clearer Adjustment of *this Affair* I am constrained to adjourn to the larger *Treatise*.

In the mean time 'tis sufficient for my *present Design* to remark, in general, that those *Minerals* and *Ores* of *Metalls* which are repositèd in the *Bodies* of the *Strata*, are either found in *Grains*, or small *Particles*, dispersedly intermix'd with the *Corpuscles* of *Earth*, *Sand*, or other *Matter* of those *Strata*: or else they are amass'd into *Balls*, *Lumps*, or *Nodules*. Which *Nodules* are either of an *irregular* and *uncertain Figure*, such as are the common *Pyritæ*: *Flints*, *Agates*, *Oxyx's*: *Pebbles*, *Cornellions*, *Jaspers*, and the like: or of a *Figure* somewhat more *regular* and *observable*, such as the *Belemnites*: the several Sorts of *Mineral Corall*, of the *Stelechites*, and

*Vulgarly call'd Fungites. of the *Lapis Mycetoides**: the *Astraites*, or *Starry-Stone*, as well that Sort with the *Prominent*, as that with the *Plane*, and that with the *Concave Stars*: the *Selenites*: the *Echinated*

Echinated Crystalline Balls, with many more analogous Bodies.

Those which are contain'd in the *Perpendicular Intervalls* of the *Strata* are, either such as are there accumulated into a *rude Heap*, without any particular *Form* or *Order*, being only included betwixt the two *opposite Walls* or *Sides* of the said *Intervalls*, which they wholely or partly *fill*, as there is a greater or less *Quantity* of them; in which Manner *Spar* is usually found herein, and other *Minerals*, as also the common *Ores* of *Lead*, *Tin*, *Iron*, and other *Metalls*: or else such as are of some *observable Figure*. Of this Sort are the *Sparry Stiria*, or *Iceycles*, called *Stalactite**: the *Native Saline Iceycles*, or *Sal Stalacticum*: the *Vitriolum Stalacticum nativum*: the *Vitriolum capillare*: the *Alumen Stalacticum*, and *capillare*: *Minera ferri Stalactica*, which, when several of the *Cylindrick Stiria* are contiguous, and grow together into one *Sheaf*, is called *Brush-Iron-Ore*: and lastly the *Argentum arborescens*, & *capillare*. Hither also ought to be refer'd the *Crystallized Ores*, and *Minerals*,

* Or rather *Stalactites*.

Minerals, e.g. the Iron-Rhombes, the Tin Grains: the Mundick Grains: the tessellated Pyrita, or Ludus Paracelsi: Crystallized Native Salt, Alum, Vitriol, and Sulphur. As likewise the Gems or Stones that are found in these perpendicular Intervalls, shot into Cubes, into Pyramidal Forms, or into angulated Columns, consisting sometimes of three, but most commonly of six Sides, and mucronated or terminating in a Point; being either opaque, or pellucid: or partly pellucid, and partly opaque, and colour'd, black, white, grey, red, purple, blew, yellow, or green; e. gr. Crystall, the Pseudo-Adamantes, the Cornish-Stones, the Brisfow-Stones, Crystallized Sparrs, the Amethyst, the Sapphire, the Topaz, the Emerald, and several others.

My Business *here* is to enquire into the Origin and Production of these metallick and mineral Bodies: to enquire how they came into this Condition, and attained these Figures. And as my Observations have been the Light whereby I have hitherto steered my Course, so I here betake my self unto *them* again; and 'tis from *them* that I prove,

That

That as the more *gross* and *massive* Parts of the *Terrestrial Globe*, the *Strata* of Stone, Marble, Earth, and the rest, owe their *present Frame* and *Order* to the *Deluge**: so likewise do *Metalls* and *Minerals*; the far greater Part of them, I mean all those which we now find lodged in these *Strata* amongst the Sand, Earth, &c. being actually reposed therein during the Time that the *Water* covered the *Earth*: and the *Earth* it self then put into such a *Condition* that the rest, I mean those we now find in the *perpendicular Intervals*, should be collected thither by *Degrees*, and be formed, almost of Course, meerly by the *ordinary Motion* of the *Water*, and its *Passage* to and fro in the *Earth**.

*Vid.
Part II.

*Vid.
Consect. 4.
Et 5. infra.

That whilst the *Corpuscles* of *Metalls* and *Minerals*, together with those of Stone, Marble, Cole, Chalk, and the like *coarser Matter*: as also the *Shells*, *Teeth*, and other Parts of *Animals*, and *Vegetables*; were sustained in the *Water*, at the *Deluge**; after some Time, that the *Commotion* was over, and the *Water* come to a calm and sedate State,

*Part II.
Consect. 2.

such of those *Corpuscles*, as happen'd to occur or meet together, affix'd to each other : and, many of them convening, uniting, and combining into one *Mass*, formed the *metallick* and *mineral Balls* or *Nodules* which we now find.

That all *metallick* and *mineral Nodules* whatever : as well those which are in *rude Lumps*, such as the common *Pyritæ*, *Flints*, *Agates*, *Onyxes*, *Pebles*, *Jaspers*, *Cornelions*, and the like : as those which are of a more *regular* and *observable Shape*, such as the *Selenites*, *Belemnites*, *Astroites*, *Stelecbites*, *mineral Coral* : and, in one Word, all others whatsoever, were formed at this Time, and by this Means.

* *Vid.*
Part V.
Consect. 1.

That in such Parts of the *Water* where the *Corpuscles* so sustain'd chanced to be all of the same Kind* : or, at least, where there were fewer Kinds or Varieties of them, the *Nodules*, which were thus form'd out of them, were more *simple*, *pure*, and *homogeneous* ; as are the *Selenites*, and some Kinds of *Pebles* and *Flints*, to name no more. But where (as indeed it generally fell out) there

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there happened to be a *greater Variety* of *Corpuscles*, as suppose of Nitre, of Vitriol, of Iron, of Copper, or whatsoever else, sustained *promiscuously* together, there the *Nodules*, formed out of them, were *mixt*, and consisted of a *greater Variety* of *Matter* confusedly associated into the *same Lump*. Of this the *Pyritæ* may serve for an *Example*; whereof some yield Iron, Sulphur, and Vitriol: others Copper and Alum, yea some of them contain all these, and several more, in the *same Nodule*.

That the *Bones, Teeth, Shells*, and other like *Bodies*, being *sustain'd* in the *Water* together with these *metallick* and *mineral Corpuscles**, and the said *Corpuscles* meeting with, and hitting upon those *Bodies*, they *affix'd* unto them, and became *conjoyned* with them; some of them (though this very rarely) passing into their *Pores* and *Interstices*: others *adhering* in *Lumps*, or *Masses*, to their *Outsides*, and indeed oftentimes combining in such Numbers upon the *exteriour Surface* of the *Shell, Tooth, &c.* as wholly to *cover* and

• Part II.
Consect. 2.

involve it in the *Mass* they together constituted : and others of them entering into the *Cavities* of the *Echini*, *Cochlea*, *Concha*, and other *Shells*, till they had quite filled them up ; those *Shells*, by that Means, serving as *Proplasmies*, or *Moulds*, to the *Matter* which so filled them, limiting and determining both the *Dimensions* and *Figure* of it. That accordingly we at this Day find some few of these fossil *Shells*, and other *Animal-Substances*, with *Iron-Ore*, *Spar*, *Vitriol*, *Sulphur*, and the like, intruded into their *Pores*. But far greater Numbers of them with *Lumps* of *Flint*, *Ores* of *Metalls*, and *Minerals*, growing firmly to the *Outsides* of them, and oftentimes in such *Quantity* that the *Shell* or *Tooth* is wholly covered by those *Minerals*, being immers'd or included in the *Mass* they constitute. Inasmuch that 'tis very usual, upon breaking *Flints*, *Pyrites*, &c. to find *Pectines*, *Concha*, and the like, enclosed, even in the very *Middle* of them. As common is it to find *Echini*, *Cochlea*, *Concha*, and other *Shells*, having their *Cavities* fill'd up with

Part IV. of the Earth:

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with Ores of Metalls, Flint, Spar, Native Vitriol, Arsenic, and other Minerals. Not but that these Minerals many times survive the Shells which gave them their Forms, and are found even after those are rotted and disappeared. For tho' when lodg'd in Chalk, or the like close Matter, which preserves and secures them against external Injuries, those Shells are constantly found upon, and actually investing the Flint, Spar, or other Mineral, and are commonly as fair and entire as any of their fellow Shells at Sea; yet, when they happened to be lodg'd amongst Sand, Gravel, or the like laxer Matter, the Shells are usually perish'd and gone*, and so the Flint, Spar, &c. left uncover'd. In which Case, the said Flint, Spar, or other Mineral, is of a constant, regular, and specifick Shape, as is the Shell whence it borrows both that Shape, and indeed its Name; these being the Bodies which are call'd, by Naturalists, Echinita, Cochlitæ, and Conchitæ*, as resembling the Shells of those Names. Which truly many of them do very nearly; they

* Vid.
Part III.
Sect. 1.
Conf. 11.

* Confer
Part V.
Conf. 5.

they having taken the *Impresses* of the *Insides* of these *Shells* with that exquisite *Nicety* as to expresse even the smallest and finest *Lineaments* of them. Inſomuch that no *Metall*, when melted and caſt in a *Mould*, can ever poſſibly repreſent the *Concavity* of that *Mould* with greater *Exactneſs* than theſe *Flints*, and other *Minerals*, do the *Concavities* of the *Shells* wherein they were thus moulded.

3. That at length all this *metallick* and *mineral Matter*, both that which continu'd *aſunder*, and in *ſingle Corpuſcles*, and that which was *amaſs'd* and *concreted* into *Nodules*, ſubſided down to the Bottom; at the ſame time that did the *Shells*, *Teeth*, and other like *Bodies*: as alſo the Sand, Cole, Marle, and other *Matter* whereof the *Strata* of Sand-Stone, Cole, Marle, and the reſt are for the moſt part *composed**; and ſo were *included in*, and *lodged* amongſt, that *Matter*.

* Confer
Part II.
Conf. 3.

That in regard that both the *ordinary Terreſtrial Matter*, and the *mineral* and *metallick Matter*, which was aſſumed up into the *Fluid* was
different

different in different Parts of it ; being in some Places all chiefly of one Kind, suppose Sand : in others of a different Kind, e. gr. Chalk : and in others of several Kinds together, as Sand, Chalk, and many more : and there being no other Place or Apartment in the Globe assigned to any of this Matter than that whereinto its own natural Gravity bore it, which was only directly downwards, whereby it obtained that Place in the Globe which was just underneath that Part of the Fluid where it was sustained when the Subsidence began ; it thence happened that the Strata, which were afterwards constituted by this Matter thus subsiding, are also different in different Places : in some all, or most of them, of Sand-stone : in others of Chalk : and in others of both Sand-stone and Chalk, and perhaps many more, lying each upon other. And the Case of Metalls and Minerals being the same, 'tis for that Reason that in some Places we now get Iron, or Vitriol, but no Copper, or Alum : in others we find these, but not those ; and, in others, both these, and those, and perhaps many more.

That

That the *Place*, both of the several Sorts of *Terrestrial Matter*, and of the *Metalls*, and *Minerals*, whilst *sustain'd* in the *Fluid*, being thus *contingent*, and *uncertain*, their *Intermixtures* with each other, and with the *Terrestrial Matter*, in the *Sediment*, or *Strata*, which *subsiding* they together *composed*, must consequently be *uncertain* likewise; that *Metall*, or *Mineral*, of whatever *Kind* it chanced to be, which was *sustain'd* in any *Part* of the *Fluid*, *seiling* only directly downwards, was *lodged* amongst the *Terrestrial Matter* which chanced to be *sustained* together with it in the *same Part*, of what *Kind* soever that *Matter* was. And accordingly we now find them *uncertainly* mixt; the same *Metall* or *Mineral* lodged, in some *Places*, in *Stone*: in others, in *Cole*: and in others, in *Clay*, *Marle*, or any other *Matter* indifferently*. And as we find the *same Metall* or *Mineral* lodged amongst different Sorts of the common *Terrestrial Matter*, so do we, for still the same Reason, also find different *Kinds* of *Metalls* and *Minerals*, *Copper*, *Iron*, and

* *Vid.**Pag. 192.**supra.*

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and Sulphur, Tin, Lead, and Vitriol, with several more, lodged all confusedly together in the very same Sort of Terrestrial Matter*.

* Vid.
Pag. 193.
supra.

That the Quantity of the metallick or mineral Matter taken up into the Fluid was various and uncertain; there being in some Parts little, or perhaps none, of it: in others a very great Abundance. And so we at this Day find it; in some Places, little, or none: in others, in such Plenty as to exceed even the ordinary Terrestrial Matter, and of it self to compose whole Strata, without any considerable Admixture of Sand, Clay, or other common Matter. Thus we sometimes see whole Strata compiled of metallick and mineral Nodules: others of Pebles, and of Flints, without the Interposition of other Matter; that finer Matter, commonly found amongst these, and vulgarly called Sand, being really no other than very small Pebles, as may appear to any one who shall carefully examine and observe it, especially with a good Microscope. Thus likewise we find Strata consisting almost entirely of Common Salt;

Salt : others of *Oebre* : and others of several *Metalls* and *Minerals*, *Tin*, *Lead*, *Vitriol*, *Nitre*, and *Sulphur*, promiscuously, without any considerable *Intermixture* of coarser *Terrestrial Matter*.

4. That the *metallick* and *mineral Matter*, which is now found in the *perpendicular Intervalls* of the *Strata*, was all of it *originally*, and at the Time of the *Déluge*, lodged in the *Bodies* of those *Strata*; being interspersed or scatter'd in *single Corpuscles*, amongst the *Sand*, or other *Matter*, whereof the said *Strata* mainly consist. That it was *educted* thence, and *transmitted* into these *Intervalls*, since that Time; the *Intervalls* themselves not *existing* till after the *Strata* were formed, and the *metallick* and *mineral Matter* was actually lodged in them; they being only *Breaches* of the *Strata*, and not made till the very Conclusion of the *Catastrophe*, the *Water* thereupon immediately withdrawing again from off the *Earth**.

• Confer
Part II.
Conf. 3. & 6.
Part III.
Sect. 2.
Confect. 3.
§ Pt. IV.
Confect. 3.

5. That the *Water*, which *ascends* up out of the *Abyss*, on all Sides of the *Globe*, towards the *Surface* of

of the *Earth**, incessantly pervading *Part III. Sect. 1. Confess. 8. the *Pores* of the *Strata*, I mean the *Interstices* of the *Sand* or other *Matter* whereof they consist, *detaches* and *bears* along with it all such *metallick, mineral, and other Corpuscles* which lye loose in its Way, and are withal so *small* as to be able to *pass* those *Interstices*; forcing them along with it into the *perpendicular Intervalls*; to which it naturally directs its *Course*, as finding there a ready *Exit* and *Discharge**, being *Ibid. partly *exhaled* thence up into the *Atmosphere*, and partly *flowing forth* upon the *Surface* of the *Earth*, and forming *Springs* and *Rivers*.

That the *Water* which falls upon the *Surface* of the *Earth* in *Rain*, bears also some, tho' a lesser, Share in this *Action*; this, soaking into the *Strata* which lye near the *Surface*, straining through the *Pores* of them, and *advancing* on towards their *perpendicular Intervalls**, bears *Part III. Sect. 1. Confess. 4. thither along with it all such moveable *Matter* as occurs in those *Pores*, in much the same *Manner* as does the *Water* which arises out of the *Abyss*; with this only *Difference*,
that

that *this* passes and pervades none but the superficial and uppermost *Strata*, whereas *the other* permeates also those which lye lower and deeper.

That the *metallick* and *mineral Corpuscles*, being thus convey'd into these *Intervalls*: and the *Water* there having more *Room* and freer *Passage* than before, whilst it only penetrated the *Pores* of the *Stone*, it *deserts* the said *Corpuscles*, leaving them in these *Intervalls*; unless it flow forth with a very rapid and precipitate *Motion*; for then it *hurries* them out along with it, till its *Motion* becomes more languid and *remiss*, when it *quits* and *abandons* them*.

* Confer
Conf. 12. &
13. infra.

6. That by the *Water*, thus passing through the *Stone* to its *perpendicular Intervalls*, was brought thither all the *metallick* and *mineral Matter* which is now lodged therein: as well that which lyes only in an *indigested* and *confused Pile**, in which Manner the far *greatest Part* of it is found, and particularly the *common Ores* of *Metalls*, *Iron*, *Tin*, *Lead*, and the rest, as also *Spar*, and other *Minerals*:

* Vid.
Pag. 197
supra.

Minerals : as that which is dispos'd and form'd into some *observable Figure*, such as the *metallick* and *mineral Stalactite*, the *angulated* or *Crystallized Metals* and *Minerals* *, and to be short, all others whatever.

* *Vid.*
Pag. 197.
supra.

That there is not, whatever some Men may have fancy'd, any thing very *strange* and *extraordinary* in the *Production* of the said *formed Metals* and *Minerals*, which are found in these *Intervalls* : nor other *plastick Vertue* concern'd in shaping them into those *Figures* than merely the *Configurations* of the *Particles* whereof they consist, and the simple *Motion* of the *Water* to bring those *Particles* together. That particularly the common *Stalactites*, *Lapis Stillatitius*, or *Drop-stone*, which consists principally of *Spar*, and is frequently found, in Form of an *Icey-cle*, hanging down from the *Tops* and *Sides* of *Grotto's*, and of the lesser *perpendicular Intervalls*, was formed by the *Water* which continually is passing through the *Strata* into these their *Intervalls*. For *this* takes the *Sparry Particles* as they lay dispersedly mingled with the *Sand*,
or

or other *Matter* whereof those *Strata* consist, and *bears* them on with it to the said *Intervalls*; where issuing leisurely out of the *Strata*, and having now free Passage, it *deserts* these *Particles*, falling down from the *Tops* and *Sides* of the *Grotto's*, to which the *Particles* affixing by little and little, *incrust* them over with a *Sparry Cover*, and also *form* these *Stalactita*, from which the *Water* is continually falling and distilling Drop by Drop; which gave Occasion to that *Mistake* of those who suppose these *Bodies* to be only *Water* petrify'd, as they speak, or converted into these *Sparry* or *Stoney Icecycles*, in the same Manner as it is by *Frost* congeal'd into the *Icey* ones which hang down from the Eaves of Houses, from Pipes, or other Conveyances of Water. That the *Iron*, and other *metallick Stalactita*: the *Aluminous*, and the *Vitriolic Stalactita*: the *Saline* ones, or those which consist of *common Salt*, and *all others*, are found *suspended* in the *same Manner*, and their *Matter* was conducted out of the *Strata* to their *Fissures* by the *same Means*.

That

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8.

That the *Iron-Rhombs*, *Tin-Grains*, and other *Ores of Metalls*, which are found in these *Intervalls* naturally formed into *Cubick*, *Pyramidal*, or other *Figures* : as likewise the *Minerals* which are there shot into the like *Figures*, such as the *tessellated Marcasits*, *crystallized native Salt*, *Alum*, *Vitriol*, and *Sulphur* : the *Gemms* also which are thus figur'd, e. gr. *Crystall*, the *Pseud-Adamantes*, the *Amethyst*, *Emerauld*, and the rest ; I say these, and all other natural *metallick* and *mineral Crystallizations*, were effected by the *Water*, which first brought the *Particles*, whereof each consists, out from amongst the *Matter* of the *Strata*, into these their *Intervalls*, in much the same Manner that the *common*, or *artificial Crystallizations* of *Alum*, *Vitriol*, and the like, are now effected in the *Water* wherein they were before dissolved : and as are the *Chymical Crystallizations* of other *Minerals* and *Metalls* in their several *Menstrua* ; whereof more in its Place.

That the *Corpuscles* of *Metalls* and of *Minerals* being smaller than
P those

9.

* Confer
Consect. 3.
pag. 207,
208,
supra.

those of *Sand* and of the other *common Terrestrial Matter*, and consequently the *Pores* of the *Strata*, which consist mainly, or at least contain in them a considerable Quantity of *these**, being *lesser* and *narrower* than those of the *Strata* of *Sand-stone*, and the like common and *crasser Matter*, the *Water* which ascends from beneath towards the Surface of the Earth is admitted into them, if at all, only in *lesser Quantity*, passes them *slowly* and *difficultly*, and therefore hath not *Scope* and *Power* sufficient to *dislodge* the *Corpuscles*, and *bear* them off with

it into the *perpendicular Intervalls*, as it does in those *Strata* which consist chiefly of *Stone*, and the like *grosser Matter*, where the *metallick* and *mineral Corpuscles* lye thinner, and so the *Pores* are more *wide* and *open*. That, for this Reason, in the *Intervalls* of those *Strata* which abound plentifully with *Iron*, *Tin*, *Spar*, *common Salt*, *Alum*, or the like, we ordinarily find a *lesser Quantity* of these *Metalls* and *Minerals* resident, than we do in the *Intervalls* of some other *Strata* which now
shew

shew little, or perhaps nothing in the *Bodies*. of them besides *Sand* and such like *coarser Matter*. For there is so admirable a *Contrivance* in this *Affair*, that the *Water* does not *disturb* and *remove* that *metallick* or *mineral Matter* which lyes in the *Strata* in great *Plenty*, and so is there *ready collected* to the *Hands of Man*: but only *that* which needs such an *Agent* to *collect* it: *that* which is so *sparingly* and *dispersedly* intermix'd with the *common terrestrial Matter*, as not to be *discoverable* by *humane Industry*; or, if *discoverable*, so *diffused* and *scatter'd* amongst the *crasser* and more *unprofitable Matter*, that 'twould never be possible to *separate* and *extract* it. Indeed if 'twas, it would not defray the *Charge* and *Labour* of the *Extraction*: and therefore it must needs have been all *irretrievably lost*, and *useless* to *Mankind*, was it not here, by this *Action* of the *Water collected* and brought into one *Mass*.

That therefore the *Metalls* and *Minerals* which are lodged in the *perpendicular Intervalls* of the *Strata* do still grow, (to speak in the *Mine-*

10.

valists Phrase) or receive additional Increase from the *Corpuscles* which are yet daily borne along with the *Water* into them. Nay they have grown in like Manner ever since the Time of the *Deluge*, in all such Places where those *Intervalls* are not already so filled that they cannot receive any more: or where the *Stock* of *metallick* and *mineral* *Corpuscles*, originally lodged in the *Strata*, is not quite exhausted, and all borne thither already. That yet this Increase is not now any where very great; the *Corpuscles*, which were capable of being stirr'd and remov'd, being, by the continual Passage of the *Water* for so many Ages, in most Places exhausted, educed forth of the *Strata*, and transmitted into these their *Fissures*.

- II. That the *metallick* and *mineral* Matter which lyes in the *Bodies* of the *Strata* does not now grow: not hath it ever receiv'd any Addition since 'twas first repos'd in those *Strata* at the Time of the *Universal Deluge*; but, on the contrary, hath been diminish'd and lessen'd by so much as hath been convey'd into their

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their perpendicular Intervalls, and as hath been brought forth upon the Surface of the Earth by Springs, Rivers*, and Exhalations† from the Abyss, ever since that Time. That notwithstanding there have, and do still happen, Transitions and Removes of it, in the solid Strata, from one Part of the same Stratum to another Part of it, occasion'd by the Motion of the Vapour towards the perpendicular Intervalls of these*.

* Vid. Conf. 12. infra.

† Vid. Conf. 14. infra.

and in the laxer Strata, such as those of Sand, Clay, and the like, from the lower ones to those which lye above them, and even to the very Surface of the Earth, occasioned by the Motion of the Vapour directly towards the Surface, it pervading these looser Strata diametrically*.

* Part III. Confess. 8.

* Ibid.

But of this I have not Room to enlarge more particularly in this Place.

That the Bitumen which is found in Lumps, or coagulated Masses, in some Springs : and which is, in others, found floating in Form of an Oil upon the Surface of the Water, when tis called by Naturalists Naphtha, and Petroleum : the Salt where-

12.

with the *Salinae*, or Salt-Springs, abound : the *Vitriol*, *Alum*, *Nitre*, *Sulphur*, *Spar*, and other *Minerals*, wherewith the *Acidulae*, or *Medicinal-Springs*, are saturated ; I say, all these *Minerals* were originally lodged in the *Strata* of Stone, Cole, Earth, or the like : that they were educed thence, and convey'd into these *Springs*, by the *Water* pervading those *Strata* in its *Passage* from the *Abyss* towards the said *Springs*.*

* Confer
Part III.
Sect. 1.
Consect. 8.
Pr. IV.
Consect. 5.

13.

That when the *Water* of *Rivers* issues out of the Apertures of them, with more than ordinary *Agitation* and *Rapidity*, it usually bears forth along it such *Particles* of *Spar*, *Argilla*, or other loose and moveable *Matter*, as it met with in its *Passage* through the *Stone*, *Marble*, or other solid *Strata*. That it sustains these *Particles*, and carries them on together with it till such Time as its *Motion* begins to remitt and be less rapid than it was at and near its *Source* ; when by Degrees it lowers them, and lets them fall, depositing and affixing them upon any Thing which occurs in the Way, as *Stones*, *Shells*, *Sticks*, or other like *Bodies* ; especially

.c. I

especially those which lye in the *Sinus's* or *Creeks* of those *Rivers*, where the *Motion* of the *Water* is more *sluggish* and *languid* than in the *Stream*, or *Middle* of the *Channel*. That some *Rivers* do thus bring forth *Spar*, and other *mineral Matter*, in great *Quantity*, so as to *cover* and *incrust* the *Stones*, *Sticks*, and other *Bodies* lying therein, to a very considerable *Thickness*. That sometimes the *Water* of *Standing-Springs* does the same; *precipitating* the *mineral Matter* which it brought forth of the *Strata*, upon the *Stones* at the *Bottoms* and *Sides* of the said *Springs*: and *affixing* it upon *Sticks*, *Straws*, and other *Bodies*, and upon the *Moss*, or other *Plants* which happen to grow therein; *incrusting* them over, in like *Manner* as does the abovemention'd *Water* of *Rivers*.

That when the *Heat* at, and upon, the *Surface* of the *Earth* is great, it not only mounts up the *Water* sent from beneath, and, along with it, the lighter *Terrestrial Vegetative Matter**, but likewise the very *mineral Matter* it self, *Sulphur*, *Nitre*,

14.
 * Part I.
 Pag. 50.
 & Pt. III.
 Sect. 1.
 Consect. 8.

Vitriol, and the like ; the *Atoms*, or *single Corpuscles* whereof, being *detach'd* from their respective *Beds* in the *Earth*, it bears quite to the *Surface* of it, and the *light* and more *active* Sorts of them up into the *Atmosphere*, together with the *Vapour*, which, when condensed, falls down again in *Rain*. That this Matter is thus carry'd up in greater or lesser *Plenty*, and to a greater or lesser *Height*, answerably to the greater or lesser Quantity or Intensity of the *Heat*.

That wherever there happen to be any *extraordinary Discharges* of the *Subterranean Heat* ; either *Vulcano's*, or lesser *Spiracles*, such as those about *Naples*, *Pozzuolo*, and in other Parts of the World : *Therma*, or *Hot-springs* : or *firey Eruptions*, such as burst forth of the *Earth* during *Earthquakes* ; I say wherever there are such or the like

+1 *Discharges* of this *Subterranean Fire*, there likewise is *mineral Matter*, more or less, *bury'd* up along with it. That even the *Heat* of the *Sun*, and indeed any other, though but an *accidental Heat*, hath the same *Effect*, and contributes to the *raising*

sing of *mineral Matter* out of the *Earth*.

That *Etna*, *Vesuvius*, and the other *Volcanoes*, discharge forth, together with the *Fire*, not only *metallick* and *mineral Matter* in great *Quantity*, but *Sand* likewise, and huge *Stones*: and with that *Force* too as to toss them up sometimes to a very great *Height* in the *Air*.

That the *Heat*, which arises out of the *lesser Spiracles*, also brings forth along with it *mineral Matter*, and particularly *Nitre*, and *Sulphur*; some of which it affixes to the *Tops* and *Sides* of the *Grotto's* as it passes, which *Grotto's* are usually so hot as to serve for *natural Stoves*, or *Sweating Vaults*: some it *deposes* near unto, and even upon, the *Surface* of the *Earth*; insomuch that in some Places the *Flores Sulphuris* are gathered in considerable *Plenty* near these *Spiracles*: some it bears in *Steams* up into the *Air*, and this in such *Quantity* too as to be manifest to the *Smell*, especially the *Sulphur*, that *Mineral* so particularly affecting this *Sense*.

That

• *Vid.*
Conf. 12.
supra.

That the *Heat* which is continually passing up towards the *Therma*, brings thither along with it *Particles* of *Spar*, *Alum*, *Sulphur*, *Nitre*, and other *Minerals*, in such *Quantity* that these ordinarily as much exceed the common *Acidula* * in *Plenty* of this *mineral Matter* as they do in *Heat*. That this *Heat*, ascending out of the *Therma*, bears up with it not only *Water*, in Form of *Vapour*, but likewise *mineral Matter*; some whereof it affixes to the *Sides* and *Arches* of the *Grotto's* where these *Therma* arise in *such*: or, if they be cover'd with *Buildings*, to the *Walls* and *Roofs* of those *Buildings*: to the *Pipes* through which the *Water* is convey'd, or the like. That *Sulphur* is in some *Places* collected very plentifully adhering to the *Stone* of these *Grotts*, and *Buildings*: yea sometimes *Spar*, and other crasser *Minerals*, are thus mounted up, till, being stop'd by the *Walls* and *Roofs*, Part affix to them, incrusting them over, and the rest are reverberated and form *Stalactita*, or *Sparry Iceycles* hanging down from the *Arches* of the *Grotto's*, from the
Capitals

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Capitals of the Pillars, and Roofs of the Buildings. That where these *Therma* are not thus cover'd and vaulted over, so that the *mineral Matter* is not stop'd and binder'd in its *Ascent*, a great Part of it advances directly up into the *Atmosphere*.

That the *Heat* which is discharged out of the *Earth* at the Time of *Earthquakes* * brings forth *Nitre*, ^{*Part III. Sect. 1.} *Sulphur*, and other *mineral Matter* ^{Conf. 12.} along with it. That the *Water* also which is at the same Time spued out †, thro' the *Cracks* or *Chasmes* ^{‡ Ibid,} opened by the *Earthquake*, and thro' ^{‡ Ibid,} the *Apertures* of *Springs* and *Rivers*, is *turbid* and *stinking*, as being highly saturated with *Sulphureous* and other *mineral Matter*. That the *Acidula*, or *Medical Springs* emit *then* likewise a greater *Quantity* of their *Minerals* than *usual*: and even the *ordinary Springs*, which were before *clear*, *fresh*, and *limpid*, become *thick* and *turbid*, and are impregnated with various *Minerals*, as long as the *Earthquake* lasts. That these *Minerals* do not issue out only at these larger *Exits*, but steam forth likewise thro' the

the Pores of the *Earth*, occasioning those *Sulphureous, Arsenical*, and other offensive *Stenches* which usually attend *Earthquakes*, and are the Cause of *Fevers* and other malignant *Distempers* which commonly succeed them; bringing on oftentimes great *Mortalities*, not only amongst *Men*, but even the very *Beasts* and *Fishes*. That these *mineral Eruptions* arise in such *Quantity* up into the *Atmosphere* as to *thicken, discolour, and darken* it sometimes to a very great Degree.

That any *Heat*, whatsoever, even an *accidental* one, such as is that which proceeds from the *Bodies* of *Animals*, and from their *Excrements*, promotes the *Ascent* of *mineral Matter*, but more especially of that which is *subtile, light, and active*, and is consequently *moveable* more easily, and with a *lesser Power*. That by this Means *Nitre* (wherever there happens to be any in the *Earth* underneath) is raised in *Stables, Pigeon-Houses*, and other like *Receptacles* of *Animals*: and in those *Places* where their *Dung* [yes heap'd up. That 'twas this which occasion'd,

sion'd, in some, an *Opinion* that *Nitre* proceeds forth of those *Animals*, and their *Excrements*; whereas it is found raised up, and convened or collected indifferently and as well in *Buildings* where *Animals* rarely or *never come*, as in those they ordinarily frequent; not to mention *that* which is found sometimes in considerable *Plenty* at great *Depths* in the *Earth*: in the *Water* of *Springs*, of *Rivers*, of *Lakes*, and, in some *Parts*, even of the *Sea* it self; whereof more largely hereafter. That, in such *Places* where the *Earth* contains *Nitre* within it, tho' there be no such *adventitious Heat*, if that *Heat* which is almost continually *steaming* out of the *Earth* be but *preserv'd*, its *Dissipation* prevented, and the *Cold* kept off by some *Building*, or other like *Coverture*, *this* alone is ordinarily sufficient to *raise* up the *Nitre*, and *bear* it out at the *Surface* of the *Earth*, (unless its *Egrefs* be impeded by *Pavements*, or the like *Obstructions*) and *mount* it up into the *Air*, as far as those *Buildings* will permit. For, the *Cielings* and *Walls* stopping
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* Confer
Pag. 222,
223,
supra.

it in its *Ascent*, it usually *affixes* unto them, and settles there. And accordingly 'tis frequently found thus *affix'd* to the *Walls* and *Cielings* of *Ground-Rooms*, *Cellars*, and *Vaults*; and this sometimes in such *Quantities* as to form *nitrose Stalactites**, hanging down from them in Form of *Iceycles*, especially from the *Tops* and *Arches* of *Cellars* and *Vaults*.

That the *Heat* of the *Sun* in the *botter Seasons* being very *intense*, and penetrating the *exteriour* or *superficial* Parts of the *Earth*, it thereby *excites* and *stirs up* those *mineral Exhalations*, in *subterraneous Caverns*, in *Mines*, and in *Cole-pits*, which are commonly called *Damps*. That it is for this Reason that *these* seldom or never happen but in the *Summer Time*; when, the *botter* the *Weather* is, the *greater* and *more frequent* are the *Damps*. That, besides *this* of the *Sun*, they are also sometimes *raised* by the *Accession* of *other Heat*, and particularly by the *Fires* which the *Miners* use in the *Grooves*, for breaking the *Rocks*, and for other Ends. That the *Quantity* of *mineral Matter* thus *raised* is according

cording as there is *more or less* of it in those *Mines*, especially of *Sulphur*, *Nitre*, and the like subtile and easily *moveable* Minerals: and as the *Heat* is there *more or less intense*. That this *mineral Matter* being *sustained* in the *Air* there, and *floating* about in the *Mines*, and *Pits*, it hits upon, and *affixes* it self unto, the *Workmens Tools*, to their *Cloaths*, *Candles*, or any other *Bodys* that occur. That where there is any considerable *Quantity* of *Sulphur* in the *Exhalation* thus *floating* to and again, it takes *Fire* at the *Candles*, burns with a *blue Flame*, and emits a strong *sulphureous Smell*. That these *Damps* differ in their *Effects* according to the *different Minerals* that are the *Cause* of them; ours in *England* being generally reducible to *two Kinds*; whereof one is called the *Suffocating*, the other the *Fulminating Damp*. That the *former* of these extinguisheth the *Candles*, makes the *Workmen* faint, and *vertiginous*, and, when very *great*, *suffocates*, and kills them. The *Fulminating Damp* will take *Fire* at a *Candle*, or other *Flame*: and, upon
its

Accension, gives a *Crack* or *Report* like the Discharge of a *Gun*, and makes likewise an *Explosion* so forcible as sometimes to kill the *Miners*, break their *Limbs*, shake the *Earth*, and force *Coles*, *Stones*, and other *Bodies*, even though they be of very great *Weight* and *Bulk*, from the *Bottom* of the *Pit* or *Mine*, up thro' the *Shaft*, discharging them out at the *Top* or *Mouth* of it, sometimes striking off the *Turn* which stands thereon, and mounting all up to a great *Height* in the *Air*; this being succeeded by a *Smoak*, which, both in *Smell*, and all other *Respects*, resembles fired *Gun-powder*: and is, as may appear from these and other *Phænomena* of it, nothing but an *Exhalation* of *Nitre* and *Sulphur*, which are the principal *Ingredients* of that *Composition* we call *Gunpowder*. That as these *Damps* are caused by *Heat*, so they are remedy'd by withdrawing that *Heat*, and by conveying forth the *mineral Steams*; which the *Miners* effect by *Perflations* with large *Bellows*: by letting down *Tubes*, and sinking new *Shafts*; whereby they give free *Passage* and
Motion

Motion to the *Air*, which ventilates and cools the *Mines*, purges and frees them from these *mineral Exhalations*.

That at such Time as the *Sun's Power* is so great as thus to penetrate the *exteriour Parts* of the *Earth*: to disturb these *mineral Particles*: and raise them from out the *Strata* wherein they lay, it does not only sustain them in the *Air* of *Grotto's*, *Mines*, and other *Caverns* under Ground, but likewise bears them out thro' the *Mouths* of those *Caverns*, and thro' the ordinary *Cracks* and *Pores* of the *Earth*, mounting them up, along with the *watery Exhalations*, into the *Atmosphere**, especially *Sulphur*, *Nitre*, and the other more *light* and *active Minerals*; where they form *Meteors*: and are particularly the Cause of *Thunder*, and of *Lightning*. That, this *mineral Matter* requiring a considerable Degree of *Heat* to raise it, the most *Northern Climes*, and the *Winter Seasons*, are, for that Reason, little or not at all troubled with *Thunder*; it seldom happening, in any great Measure, but in the *hotter Months*,

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* *Vid.*
Part III,
Sect. 1.
Consect. 8.

* *Vid.*
Pag. 141.
supra.

and in the *Southern Countries*, as in *Congo*, *Guinea*, and other Parts of *Africa*, and in the *Southern Parts* of *Asia* and *America*; where 'tis, during the *Season* of their *great Rains**, horribly loud and astonishing, and as much exceeds the *Thunder* of these *Northern Climes*, as the *Heat* there exceeds that of these *Climes*. That the *mineral Matter* which is discharged forth of *Volcano's*, and other like *Spiracles*: and out of the *Therma*, ascends up into the *Air*, and contributes to the *Formation* of these *Meteors*. That likewise the *Nitre* and *Sulphur*, which are belch'd forth of the *Earth* at the Time of *Earthquakes* (the *Countrys* which are most obnoxious to this *Malady* abounding, as I have already intimated*, with these two *Minerals* particularly) in such *Plenty* as to thicken and darken the *Air*, constitute there a kind of *Aerial Gunpowder*, and are the *Cause* of that dismal and terrible *Thunder* and *Lightning* which commonly, if not always, attend *Earthquakes*; even when all was till then calm and clear, and there was not the least *Sign* or
Presage

* *Vid.*
Pag. 157.
supra.

Part IV. of the Earth.

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Presage of any such Thing before the *Earthquake* began.

That as the *mineral Eruptions* which happen during *Earthquakes**: *and the Steams and Damps of Mines*†, are detrimental to *Health*, hurtful and injurious to the Bodies of *Men* and other *Animals*, so likewise are the *mineral Exhalations* which are thus raised by the *Sun* out of the Body of the *Earth* up into the *Atmosphere*; but more especially in those *Parts* of it where there are *Arsenical*, or other like *noxious Minerals* lodg'd underneath. That *these* mingling with, and being disseminated in the *Air*, and passing together with it into the *Lungs* in *Respiration*, are by them transmitted into the *Body*, where they infect the Mass of *Blood*, create *Perturbations* and disorderly *Motions* therein, and lay the Foundation of *Pestilential Fevers*, and other malignant *Distempers*. That 'tis for this Reason that the *Southern Countreyes* are more frequently molested and incommoded by these *Distempers* than the *Northern* are: and that they are more rife and stirring in the *hotter Months*, in *July*

* *Vid.*

Pag. 224.

supra.

† *Vid.*

Pag. 227,

228, supra.

and *August*, than in the *colder*, *December*, *January*, and the rest. That 'tis indeed true, that in *September* and *October*, which are none of the *hottest Months*, these *Diseases* are oftentimes as *epidemical* as in the precedent and *warmer Season*: and do not *abate* and *remit* in Proportion to the *Remission* of the *Sun's Heat* in those Months. But this is purely *accidental*, and happens meerly because the *Heat within the Earth* is not liable to so *sudden Vicissitudes*, or so *quickly spent* and *dispers'd*, as is that which is *upon* it, and in the *Air*. This therefore, the *Pores* of the *Earth* remaining still as *free*, and *open*, as ever, continues to *send out the mineral Steams* as before, but in *lesser* and *lesser Quantity*, answerably to the gradual *Diminution* of this *Heat*. Which *Steams*, though now sent up to the *Surface* of the *Earth* only in *lesser Plenty*, may be much more *offensive* and *mischievous* than in the *hotter Months* when they came forth in far *greater*. For the *Sun's Power* being in *those Months* also *greater*, it then straitways *hurries* these *Steams* up into the *Atmosphere*.

sphere. Whereas in the *colder*, its Power being *lessen'd*, it cannot bear them up so *fast* ; so that they then *stay* and *stagnate* near the *Surface* of the *Earth*, *swimming* and *floating about* in that *Region* of the *Air* wherein we *breathe* ; where they must needs be much more *pernicious* than when borne up to a *greater Height*, and so farther out of the *Way*. And this is indeed much the *Case of Fogs* ; particularly of those which we frequently observe after *Sun-setting*, even in our *hottest Months*. These are nothing but a *Vapour*, consisting of *Water*, and of such *mineral Matter* as this met with in its *Passage*, and could well *bring up* along with it. Which *Vapour* was sent up in *greater Quantity* all the *foregoing Day*, than now in the *Evening*. But the *Sun*, *then* being above the *Horizon*, taking it at the *Surface* of the *Earth*, and rapidly *mounting* it up into the *Atmosphere*, it was not *discernible*, as *now* it is ; because, the *Sun* being now *gone off*, and ceasing any longer to *operate* upon it, the *Vapour stagnates* at and *near* the *Earth*, and saturates the

Air till 'tis so *thick* as to be easily *visible* therein. And when at length the *Heat* there is somewhat *further spent*, which is usually about the *Middle* of the *Night*, it *falls* down again in a *Dew*, alighting upon *Herbs* and other *Vegetables*, which it *cherishes*, *cools*, and *refreshes*, after the *scorching Heat* of the *foregoing Day*. But if it happens, as sometimes it does, that *this Vapour* bears up along with it any *noxious mineral Steams*, it then *blasts Vegetables*, especially those which are more *young* and *tender* : *blights Corn*, and *Fruits* : and is sometimes *injurious* even to *Men* who chance to be then *abroad* in the *Fields*. 'Tis also the *Case* of *Water* at the *Surface* of the *Earth**; where the *Springs* and *Rivers* are very *low*, yea some of them *cease* to yield any *Water* at all, in the *Summer Months*; because the *Sun's Power* is then so *great* as easily and speedily to *bear up* into the *Atmosphere*, in small and invisible *Parcels*, and in *Form* of an extremely fine and thin *Vapour*, a very great Part of the *Water* which is *sent up* out of the *Abyss*. Whereas, in the *Winter-time*,

* Confer
Part III.
Sect. 1.
Consect. 8.

Part IV. of the Earth:

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time, the *Sun* is withdrawn farther off, and its *Power lessen'd*, so that it cannot then buoy it up as before ; for which Reason 'tis that so much more of it then stands at the *Surface* of the *Earth*, and stagnates there. So likewise for *Rain* ; we learn from *Experiment* that there commonly falls in *England*, in *France*, and some other Countreyes, more *Rain* in *June* and *July*, than in *December* and *January*. But it makes a much greater *Shew* upon the *Earth* in these Months than in those, because it lyes longer upon it ; the *Sun* now wanting *Power* to exhale and bear it up so quickly and plentifully as then it did. 'Tis likewise the *Case* of the *Halitus* emitted forth of the *Lungs* of *Men* and other *Animals*. In a *Physiological Treatise*, which I have by me, concerning the *Structure and Use of the Parts of Animals*, discoursing of the *Lungs*, I shew that they are one grand *Eminctory* of the *Body* : that the main *End* of *Respiration* is continually to discharge and expell an *excrementitious Fluid* out of the *Mafs* of *Blood* : and I prove from several *Experiments* that

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there passes out of the *Body* a *greater Quantity* of *Fluid Matter* this Way, I mean upwards, and through the *Lungs*, than there does of *Urine*, by the *Kidneys*, downwards. Now the *Fluid*, which is thus *secreted*, and *expired* forth along with the *Air*, goes off with it in insensible *Parcels*, in the *Summer Season*, when the *ambient Air* contains *Heat* enough to *bear* it quickly away, and so *disperse* it. But, in the *Winter*, when the *Heat* without is *less*, it oftentimes becomes so far *condens'd* as to be *visible*, flowing out of the *Mouth* in Form of a *Fume*, or *crasser Vapour* : and may, by proper *Vessels*, set in a strong *freezing Mixture*, the better to *condense* this *Vapour*, be *collected* in *considerable Quantity*. But to return. That 'tis not without a very extraordinary *Providence* that there so constantly happens, in the Month of *September* (the *Time* when chiefly these *mineral Steams* stagnate thus at and near the Surface of the Earth) a very *nipping* and *severe Season* of *Cold*, far beyond what might, from the *Sun's Height* and *Power*, be then expected :

pected: beyond that of *October* and *November*: and sometimes equal to that of *January*, and the *coldest Months*: as also that there then so constantly happens very *blustering* and *turbulent Winds*; the *Cold* serving to *check* and put a *Stop* to the *Ascent* of this *mineral Matter*: and the *Winds* to *dissipate* and *convey away* that which was before *rais'd* out of the *Earth*; which, was it not thus *carry'd off*, would be infinitely more *fatal* and *pernicious* to *Man* and other *Animals* than *now* it is. But I must be contented here to give only short *Hints* of these, as of other Things: and to write but obscurely and reservedly, untill I have Opportunity to express my *Sentiments* of them with greater Copiousness, Freedom, and Perspicuity.

Thus much of the *Scheme* of my *Design* in this Part have I run over: and led my Reader a long and tedious Jaunt in tracing out these *metallick* and *mineral Bodies*: in pursuing them through their several *Mazes* and *Retreats*: through the *Earth*, the *Water*, and the *Air*. And yet,

yet, long as it is, we are not much farther than the *Borders* of the *mineral Kingdom*, and have done little more yet than settled and adjusted *Preliminaries*; so very *ample* is this *Kingdom*, so *various* and *manifold* its *Productions*. For the foregoing *Conclusions* relate only to the *Origin* and *Growth* of *these Bodies*; the *Natural History* of each *particular Metall* and *Mineral*, with the *Observations* whereon that *History* is grounded, being still to come. But I must be forced wholely to wave and supersede the *Detail* of these; for I perceive, do what I can, this *Abstract* will swell much beyond the *Bounds* which I at first design'd.

This Fourth Part will be follow'd by several *Treatises*, serving to confirm, and to illustrate some *Passages* in it; whereof I shall at present only mention the *four* following.

1. *Rules and Directions* for the *Discovery* of *Metalls* and *Minerals* latent in the *Earth*; with an *Enquiry* why these lye sometimes so

* Part II. near the *Surface*, and did not, (be-
 Cause of their *greater Gravity*) at
 the *General Subsidence* in the *Deluge**,
 fall

Consect. 3.
 Pt. IV.
 Consect. 3.

fall to a much *greater Depth* than we now find them : even to such a *Depth* as to have lain quite out of *humane Reach*, and so have been all *bury'd*, and irrecoverably *lost*.

2. An examination of the Common Doctrine about the *Generation of Metalls and Minerals* : and particularly *that* of the *Chymists* ; with an Appendix, relating to the *Transmutation of Metalls* ; detecting the *Impostures and Elusions* of those who have pretended to it : and evincing the *Impossibility* of it from the most plain, simple, and *Physical Reasons* : proving likewise that there are no such natural *Gradations*, and *Conversions* of one *Metall* and *Mineral* into another, in the *Earth*, as many have fancy'd. As also an Account of the *mineral Juices* in the *Earth*, which some *Writers* have imagined to be I know not what *Seeds of Minerals* ; shewing that they are, for the far greatest Part, nothing but *Water* strongly impregnated with *mineral Matter*, which it derives from the *Strata* as it passes through them*.

3. Rela-
* Conf. 5.
Ec. supra.

3. Relations, obtain'd from several Hands, concerning the *State of Metalls and Minerals in Foreign Countries* : in divers Parts of *Asia, Africa, and America*, as well as in *Hungary, Germany, Sweden*, and other Parts of *Europe*; and particularly of those which are not found in *England*; shewing that the *Condition* of these *Bodies* in those remoter *Regions* is exactly conformable to that of *ours* here : and that they were all put into this *Condition* by the very *same Means**.

* Confer
Consect. 1.
supra.

4. *Observations* concerning English *Amber* : and *Relations*, from abroad, about the *Amber of Prussia*, and other distant Places. With a *Discourse*, founded upon them, proving that Amber is not a *gummous* or *resinous Substance* drawn out of Trees by the Sun's Heat, and coagulated and harden'd by falling down into Rivers, or the Sea; as the *Ancients* generally believ'd : but is a *Natural Fossil*, as Pebbles, Flints, *Pyrite*, and the like, are : form'd at the *same Time*, and by the *same Means* that they were : and all of it originally repos'd in the *Strata* of Earth,

Earth, Sand, &c. together with them. That it is indeed found in some Places lying upon the *Shores* of the *Sea*, and of *Rivers*; but 'tis also found at *Land*, and dug up (sometimes at very great *Depths*) in the *Earth*: and this as well in Places very *remote* from any *Sea*, or *River*, as in those which are nearer unto them. That 'tis digg'd out of even the *highest Mountains*, and indeed all other *Parts* of the *Earth*, contingently, and indifferently, as the *Pyrites*, *Agates*, *Jaspers*, *Pebles*, and the rest, are. That wherever 'tis found upon the *Sea-Shores*, there also is it as certainly found at *Land*, up in the neighbouring Country: and particularly in *Prussia*, upon whose *Shores* so great a *Quantity* of *Amber* is yearly collected, 'tis dig'd up almost all over the *Country*. That even that which now lyes loose upon the *Sea-Shores*, was all of it *originally* lodg'd in the *Earth*: in the *Strata* of Sand, Marle, Clay, and the like, whereof the neighbouring *Land*, and the *Cliffs* adjacent to those *Shores*, do consist; and wherever 'tis so found scatter'd upon the
Shores,

Shores, there is it as constantly found lodg'd in the *Cliffs* thereabouts. That when the *Sea*, at High-water, comes up unto, and bears hard upon the said *Cliffs*, and is agitated by *Winds* and *Storms*, it frequently *beats down* huge Pieces of *Earth* from them. Which *Earth*, falling into the Water, is, by its continued *Agitation* and *Motion* dissolved : and borne by Degrees down into the *Sea*, being loose, and light, and so easily reduced into lesser *Parcels*, dissipated, and wash'd away. But the *Pebles*, *Pyrita*, *Amber*, or other like *Nodules*, which happen'd to be repos'd in those *Cliffs*, amongst the *Earth* so beaten down, being *hard*, and not so dissoluble, and likewise more *bulky* and *ponderous*, are left behind upon the *Shores*; being impeded, and secur'd, by that their *Bulk* and *Weight*, from being born, along with the *Terrestrial Matter*, into the *Sea*. That therefore the *Sea* is no ways concern'd in the *Formation* of these *Bodies* : no more in the *Formation* of *Amber*, than of the *Pyrita*, *Flints*, and other *mineral Masses* that are found together

ther with it : but only *dislodges* and *discovers* them, bears away the *Earth* wherein they were *bury'd*, washes off the *Soil* and *Sordes* wherein they were *involv'd* and *conceal'd*, and thereby renders them more *conspicuous*, *apparent*, and easy to be *found*. That this is so known and experienc'd amongst the *People*, who are employ'd to *gather* the *Amber*, that they always run down to the *Sea Side*, for that Purpose, after a *Storm* : and, if it hath been so *great* as to beat down Part of the *Cliffs* there, they assuredly find *Amber*, more or less, upon the *Seas Ebb* and Retirement, and after every *Retreat* of the *Sea* for some *Tides* after ; the *Sea* not bearing down the *Earth* immediately and all at once, but washing it off by little and little, and so *discovering* the *Amber* by Degrees, some after one *Tide*, and some after another. That particularly the *Amber*, *Vitriolick Pyrite*, and other like *Bodies*, that are found upon the *Shores* of *Kent*, *Essex*, *Hampshire*, and elsewhere, all came first of the *bordering Cliffs*, and were dislodged by *this Means* : and
are

are found in the *Earth*, as well as upon the *Shores*, whenever 'tis laid open, as in sinking *Wells*, *Pits*, and the like. That not only the *Sea*, but *Rivers* and *Rains* also, are instrumental to the *Discovering* of *Amber*, and other *Fossils*, by washing away the *Earth* and *Dirt* that before cover'd and concealed them. Thus the *Golden Nodules*, or, as they are commonly call'd, *Gold-grains*, *Amethystine Pebbles*, *Amber*, and other *Stones of Worth*, are uncover'd by such *Rivers* as chance to run through the *Grounds* which contain those *Bodies* in them. Thus likewise *Rains*, by their washing the

• *Part V. Earth* down from off the *Hills**,
Consect. 2. clear, and disclose such *Pyrita*, *Selenita*, or other *Bodies*, that happen to be lodg'd, near the *Surface* of the *Earth*, in those *Hills*. And 'tis by this Means chiefly that the *Grain-Gold*, upon all the *Gold-Coast* (as 'tis call'd) in *Guinea*, is display'd; the *Rains*, falling there in great *Abundance*, and with incredible *Force*, thereby the more powerfully *beating off* the *Earth*. This the *Negroes*, *Natives* of those *Parts*, know full well:

well : and therefore do not expect to find much of it unless after the *Season* of their *Rains* *; when they ^{* Vid.} never fail to find it, no more than ^{Part III.} the *Amber Gatherers* fail of finding ^{Señ. 1.} *that* upon the *Sea-Coasts* after a *Storm*. ^{Confect. 8.} And if those *Persons* who are curious in *collecting* either *Minerals*, or the *Shells*, *Teeth*, or other *Parts* of *Animal Bodies*, that have been *buried* in the *Earth*, do but search the *Hills* after *Rains*, and the *Sea-Shores* after *Storms*, I dare undertake they will not lose their Labour. But to return. That *Amber* is not only lodged in the *Strata* of *Earth*, and of *Sand*, together with the other *mineral Nodules*, but is sometimes found actually growing unto, and combined into the same *Mafs* * with ^{* Vid.} the *Pyrites*, and *others* of them. ^{Confect. 24} That it likewise contains in it ^{supra.} *Insects*, *Flies*, *Shells*, and other *heterogeneous Bodies*, in like Manner as the *Pyritæ*, *Flints*, and all other analogous *Fossils* do *. That altho' ^{* Ibid.} *Amber* be most commonly of a *yellowish Colour*, and therefore not unlike some *Kinds* of *Gumms*, yet there is found of it also of several

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other Colours, as Black, White, Brown, Green, Blue, and Purple, to name no more. Yea the very same Lumps is frequently of different Colours. That these Colours are all accidental, even the yellow it self, and owing to the Intermixture of foreign Matter, which concentered into the same Mass, with the proper Matter of this Stone, and with the heterogeneous Bodies which are included in it, at the Time of its Coagulation*. That this is the Case of Agates, of Cornelians, of Topazes, and many other coloured Stones; the Colours of several whereof, and even that of Amber it self, may, by a very easy Process, be, in great Measure, if not wholly, extracted, and taken from them: and the Bodies of these Stones rendred almost, if not quite, as pellucid as Crystall, without sensibly damaging the Texture of them. That even the most obvious and ordinary Minerals are not free from this Contagion of adventitious Matter; Common Salt it self, when found naturally crystallized amongst other Minerals and Metalls, in the perpendicular Intervalls of the Strata of Stone,

Part IV. of the Earth.

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Stone, being, not only *pellucid*, as it naturally is when *pure* and *simple*, but *white* also, and like the *white crystallized Spar* : *yellow*, and nearly resembling the *Topaz* : *blue*, and not unlike the *Sapphire* ; and yet these specious *Bodies*, and *Gemms* as to outward Shew, upon *Trial*, yield nothing but *meer Salt*, with an extremely small *Admixture* of other *Matter*, which gave them their *Tincture*. Which may serve for a further *Instance* of the *confused State* of *Minerals* in the *Earth* : and of the *Uncertainty* of their *Colours*, and

* Confer
pag. 190,
to 193.

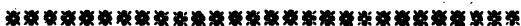


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PART



PART V.



*Of the Alterations which
the Terraqueous Globe hath
undergone since the Time of
the Deluge.*

I T now remains that we take
a View of the *Postdiluvian*
State of this our *Globe*: that
we examine how it hath *stood* for
this last four thousand Years: that
we enquire what *Accidents* have be-
fallen it, and what *Alterations* it
hath suffered *since* that wonderful
Change it underwent at the *Deluge*.

There have been some who have
made a mighty Outcry about *Chan-*
ges and *Alterations* in the *Terraqueous*
Globe. The *Pretences* and *Pleas* of
each I consider in the *first Part* of
this *Essay*; shewing that they are
without

without any just Grounds: and that there are no *Signs*, or *Footsteps*, in the whole *Globe*, of such *Alterations*. And indeed 'tis well for the World that there are not; for the *Alterations*, which they have fancy'd, are such as turn all the *wrong Way*: such as are without *Use*, and have no *End* at all, or, which is worse than none, a *bad* one: and tend to the *Damage* and *Detriment* of the *Earth* and its *Productions*.

Notwithstanding, some *Alterations* there are which it hath, and doth still undergo. This is what we may pronounce with *Certainty*: and there want not *Instances* enough sufficiently to vouch and attest it. But these *Alterations* are of a quite different *Strain*: these are as *amicable* and *beneficent* to the *Earth* and *Terrestrial Bodies*, as the *others*, were there really such, would be *pernicious* and *destructive* to both. I have already given* some *Intimations* of the Chan- Part IV.
ges which happen in the *interiour* Consect. 4.
Parts of the *Earth*, I mean the *Transitions* and *Removes* of *Metalls* and *Minerals* there: and shewn of

• Ibid.
Consect. 9.

what Use and Advantage those Changes are to the World*. So that I may now pass freely on to consider those which befall the exterior, or Surface of it. And these are brought about silently and insensibly: and, which is the constant Method of Nature, with all imaginable Benignity and Gentleness. Here is none of the Hurry and Precipitation, none of the Blustering and Violence: no more than any of the dreadful and ruinous Effects, which must needs have attended those Supposititious Changes. And as these Alterations are not great, so neither are they numerous. I have made careful Search on all Hands, and canvass'd the Matter with all possible Diligence: and yet there are none that I can advance from my own Observations, but,

- I. That the upper or outermost Stratum of Earth, that Stratum whereon Men and other Animals tread, and Vegetables grow, is in a perpetual Flux, and Change; this being the common Fund and Promptuary that supplies and sends forth Matter for the Formation of Bodies upon the Face of the Earth. That all Animals,

Animals, and particularly *Mankind*, as well as all *Vegetables*, which have had *Being* since the *Creation* of the *World*, derived all the *constituent Matter* of their *Bodies* successively, in all *Ages*, out of this *Fund*.

That the *Matter*, which is thus drawn out of this *Stratum* for the *Formation* of these *Bodies*, is at length laid down again in it, and *restored* back unto it, upon the *Dissolution* of them; where it lies ready to be again *assumed*, and *educed* thence for the *sitting forth* of other like *Bodies*, in a *continual Succession*.

That the *constituent Matter* of any one *Body* being *proper*, and turning thus naturally, when again *refunded* into this *Stratum*, to the *Constitution* of another like *Body*, there is a kind of *Revolution* or *Circulation* of it; so that the *Stock* or *Fund* can never possibly be *exhausted*, nor the *Flux* and *Alteration* sensible.

That as the *Bodies* which arise out of this *Fund* are *various*, differing very much, not only from one another, but the *Members*, *Organs*, or *Parts* of each individual amongst themselves; so likewise is the *Mat-*

ter of this *Fund* whereof they all consist. For though, when confusedly *blended* and *mingled*, as it is whilst lying in this *Stratum*, it may put on a *Face* never so uniform and alike, yet it is in reality very *different*, and consists of *several Ranks, Sets, or Kinds of Corpuscles*.

That all the *Corpuscles* that are of the *same Set, or Kind*, agree in every Thing, and are most exactly like unto each other in all *Respects*. But those that are of *diverse Kinds*, differ from one another, as well in *Matter or Substance*, in *Specifick Gravity*, in *Hardness*, in *Flexibility*, and several *other Ways*, as in *Bigness*, and *Figure*. That from the various *Composures and Combinations* of these *Corpuscles* together, happen all the *Varieties* of the *Bodies* formed out of them: all their *Differences* in *Colour* and outward *Appearance*, in *Taste*, in *Smell*, in *Hardness*, in *specifick Gravity*, and all other *Regards*; in much the same manner as that vast Variety we see of *Words* arises from the various *Order and Composition* of the twenty four *Letters* of the Alphabet. But of *this Matter*,
and

- and of the *Process* and *Method* of *Nature* in the *Formation* of *Bodies* out of it, I shall treat more at large in the *Discourse* it self; wherein I shall also consider the *Opinions* of *Others*, particularly the *Ancients*, and, amongst the rest, of *Thales* and *Pythagoras*, about the *Elements* or *Principles* of *Natural Things*; for I now hasten to propose the *other Alterations* that happen in the *Terraqueous Globe*.

That *Rocks*, *Mountains*, and the 2.
other *Elevations* of the *Earth* (especially those whose *Surfaces* are yearly stirr'd and disturbed by digging, plowing, or the like) suffer a continual *Decrement*, and grow *lower* and *lower*; the superficial *Parts* of them being by little and little wash'd away by *Rains*, and *borne down* upon the subjacent *Plains* and *Valleys*. That even the *Stone* it self (whether naked and uncover'd as in *Rocks*, or invested with a *Stratum* of *Earth* as is that in our ordinary *Hills*) is not, by its *Solidity*, privileged and secur'd against them, but is *dissolved* by *Degrees*, and wash'd also down,
in

in its turn, as well as the looser Earth.

3. That the *Matter*, which thus devolves from the *Hills* down upon the *lower Grounds*, does not considerably raise and augment them; a great Part of it, viz. the *vegetative* and *lighter Terrestrial Matter*, being either mounted up into the *Atmosphere* by the ascending Vapour*, or carry'd along with the Rain-water into *Rivers*, and, by them, into the *Sea*†; whence 'tis returned back again to the Earth dispersedly by *Rain*‡, and serves for the *Nutrim*ent and *Formation* of the *Plants* which grow thereon: and the rest of it, being more crass and ponderous, does not move far, but lodges in the *Clefts*, *Craggs*, and *Sides* of the *Rocks* or *Mountains*, and at or near the *Roots* or *Bottoms* of them.

4. That the *Stone* of *Rocks* and *Mountains* being by *Degrees* in this Manner dissolved, and the *Sand* borne off, the *Shells*, and other *Marine Bodies* which were originally included therein*, are by that Means let loose, turned out, and exposed upon the *Surface* of the *Earth*. That 'tis for this

* Vid.

Part III.

Seft. 1.

Consect. 8.

†† Confer

Pag. 50.

§ seq. uti

§ Pag.

143. §

seqq.

* Part II.

Consect. 3.

this Reason that these *Marine Bodies* are now most commonly found upon *Hills*, and the *higher Grounds*; those *few* which are found *below* and at the *Bottoms* of them, being for the most part only such as have *fallen down* from above, and from the *Tops* of them. For those which were, at the Time of the *Deluge*, reposed upon the *Surface* of the *Earth*, are most of them *perish'd* and *gone**. And indeed *these*, which are yet existent, are *preserv'd* only accidentally, by their being at first *enclosed* in the *Strata* of *Stone*, or other close Matter, and so secured by it as long as it was it self secure, I mean, until it was thus *dissolv'd*, and so could no longer contribute any thing to their *Preservation*.

* *Vid.*
Pag. 70, 83
71, supra.

5.

That these *Shells* and other *Bodies*, being thus *turned out* of the *Stone*, and *exposed* loose upon the *Surface* of the *Earth*, to the *Injuries* of *Weather*, and of the *Plough*, to be *trod upon* by *Horses* and other *Cattle*, and to many other *external Accidents*, are, in Tract of Time, *worn*, *fretted*, and *broken* to *Pieces*.

That

That the *Shells* being so broken, struck off, and gone, the *Stone* included in them is thereby *disclosed* and set at *Liberty*; which *Stone* consists of the *Sand* wherewith the *Cavities* of those *Shells* were filled when they were *sustained* together with it in the *Water* at the *Deluge**, and which at length *subsided* in them, and was *lodged* with them in the *Strata* of *Sand-Stone*; the *Sand* contained within the *Shell* becoming *solid* and *consistent* at the same Time that the *ambient*, or that of the *Stratum* without, did*.

* Part II.
Conf. 2. & 3.

* Part II.
Conf. 4.

That therefore the *Shells* served as *Plasms* or *Moulds* to this *Sand*; which, when *consolidated*, and afterwards in tract of Time by this means *freed* from its *investient Shell*, is of the same *Shape* and *Size* as is the *Cavity* of the *Shell*, of what Kind soever that *Shell* happened to be. That this is the true *Origin* of those *Stones* (consisting of *Sand**) which are called, by Authors, *Cochlita*, *Conchita*, *Muita*, *Ostracita*, *Ctenita*†, &c. and which are of *constant*, *regular*, and *specifick Figures*; as are the *Cochlea*, *Concha*, and the other

* Those
which consist
of Spar,
Flint, &c.
I have con-
sider'd a-
bove, Part
4. Conf. 2.
† Vulgarly
Pectinitæ.

other *Shells* in which they were *moulded*, and from which, by reason of their so near *Resemblance* of the *Insides* of them, they borrow their several *Denominations*.

That these *formed Stones* being by this Means despoil'd of their *Shells*, and expos'd naked, upon the Surface of the Ground, to the *Injuries* before recited, do also *themselves* in Time *decay*, *wear*, and *moulder* away, and are frequently found *defaced* and *broken* to *Pieces*; in like Manner as the *Strata* of Stone, wherein they were originally lodged, first did: and afterwards the *Shells*, wherein these *Stones* were enclosed and formed.

This *Deterration*, as 'tis call'd, or Devolution of Earth and Sand from the *Mountains* and *higher Grounds*, is not in equal *Quantity* and alike in all Places, but *varies* according to the different *Height* of those *Moun-* * Which
tains, and to the *Extent* of the *Plane* are greater, and
at Top of them: to the different fall with
Consistence and Durableness of the more Violence in
Strata whereof they consist: and some Coun-
according as they are more or less tries than
disturbed by *Showers**, *Plowing*, or in others.
other Vid. Part
3. Conf. 8.

other *Accidents*. Nay this *Detraction* varies in different Parts of even the *same Mountain*; those which lye neaver to the *Brink* or *Margin* of it suffering a quicker and greater *Decrement* than those which are more remote therefrom, and towards the *Middle* of it. But, though this *Devolution* be thus different, 'tis not any where, even where greatest, very *considerable*: and therefore does not make any great *Alteration* in the Face of the Earth. This I have learn'd from *Observations* purposely made in several Parts of *England*: and when I shall, in the larger Work, propose the *Standard* whereby I give *Judgment* of it, any one may presently and easily inform himself of the *Quantity* and *Measure* of it, either *here*, or in any other Part of the *World*.

There are indeed some other *Casualties* that the *Globe* is obnoxious unto, such as *Earthquakes*, and the burning Mountains, or *Volcanoes*. But of *these*, I thank God, and the good Constitution of this happy Island, I have not had an Opportunity of *Observation*. Yet something
I have

I have to offer concerning *these*, and the *Causes* of them, from the *Observations* of *others*. Not that the Thing is so very material, or that they make such Havock, and *Alterations* in the *Globe* as some Men fancy. We have Assurance from *History*, that *Ætna* and *Vesuvius* have sent forth Flames; by fits, for these two or three thousand Years: and no doubt but they have done so much longer. And yet we see both *Sicily* and *Campania*, the Countries wherein those two Mountains stand, are still where they were: nay the very Mountains themselves are yet in *Being*, and have not suffered any considerable *Diminution* or *Consumption*, but are at this Day the two *highest* Mountains in those Countries. What they have really suffer'd: by what Means both *these*, and *Earthquakes*, are occasion'd: and what are their *Effects* upon the *Globe*, shall be fully and carefully consider'd in due Place. From which Considerations it will appear, that even *these* have their *Uses*: and that, although they do make some lesser *Alterations* in some few Parts of the Earth,

Earth, and sometimes molest and incommode the Inhabitants of those Parts, yet the *Agent*, whereby both the one and the other is effected, is of that indispensable *Necessity* and *Use* both to the *Earth* it self, to *Mankind*, and to all other the *Productions* of it, that they could not *subsist* without it. I have already given some brief Intimations that

*Part IV. *Winds and Hurricanès at Land**,
 Conf. 14. *Tempests and Storms at Sea* †, (Things
 Pag. 237. that have always been look'd upon
 † Vid. with as evil an Eye as Earthquakes,
 Pag. 51, and pointed at as only disastrous
 52, &c. and mischievous to the World) are

yet not without a very necessary and excellent *Use* : the same have I also done concerning *Volcanoes**;
 *Part III. Sect. 1. but I must not dwell upon these
 Conf. 13. Things too long, wherefore I shall only now dispatch what is further necessary to be hinted here about this *Decrement of Mountains*, and then conclude this Part.

And *this*, as it does not make any great *Alteration*, so neither doth that, which it really does make, any ways *endamage* or disorder the *Globe*. 'Tis not any the least *Detriment* or *Disadvantage*

Disadvantage to the *Productions* of it, to *Vegetables*, to *Animals*, and particularly to *Mankind*. Nor does it thwart and interfere with the grand *Design* of *Providence*, viz. the *Conservation* of the *Globe*, and the *Propagation* of *Bodies* upon it, for the *Use* of *Man*. So far from this, that it is very highly *beneficial* and *serviceable* to both; which will farther appear if we consider.

That in the *first Ages* after the *Deluge*, when the *Number* of *Mankind*, of *Quadrupeds*, and of the other *Animals* was but *small*, the *Valleys* and *Plains* were more than sufficient for their *Habitation* and *Use*. And, by such Time as that *Stock* of them was *enlarged*, that they were further spread and *multiplied*, and thereby the *Earth* so far peopled and replenish'd that the *Hills* and higher *Grounds* began to be *needed*, those *Rocks* and *Mountains*, which in the *first Ages* were *high*, *steep*, and *craggy*, and consequently then inconvenient and unfit for *Habitation*, were, by this continual

was wholly unfit and improper for the Formation of *Vegetables*. Nay, the *Inconvenience* would not have stop'd *there*, but have spread it self much *further*. For, had the Vegetative *Stratum* been carry'd off, the *Devolution* still continued, and so the Matter of the *lower* or *mineral Strata* been likewise by Degrees *born down* successively to the *Roots* and *Bottoms* of the *Hills*, and upon the neighbouring Parts of the *Valleys* and *Plains*, this would, as far as it reach'd, have *cover'd* and *bury'd* the *upper* and *vegetative Stratum* that was expanded over those *Valleys* and *Plains*, and render'd as much of them as it so cover'd also frustrate, *steril*, and *unfruitful*. So that, by this Means, in the *latter Ages* of the *World*, when the *Earth* should be fully *peopled*, and all *Quarters* and *Corners* of it *stock'd* with *Inhabitants*, and when consequently there would be the *greatest Need* and Occasion for its *Productions* every where, for Supply of the *Necessities* of these its *numerous Inhabitants*, there would have

Part V. *of the Earth.*

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have been then *much fewer* than ever ; a great Part of the Earth being render'd intirely *barren*. So that they might have e'en *starv'd*, had it not been for this Providential *Reserve* : this *Hoord*, if I may so say, that was stowed in the *Strata* underneath, and now seasonably *disclosed* and brought forth.



S 3

PART



PART VI.

Concerning the State of the Earth, and the Productions of it, be- fore the Deluge.



THE Thread of this *Dis-
course* draws now near to
an *End*: and I have Reason
to fear that, by this *Time*, the Rea-
der, as well as my self, thinks it
high *Time* that it were quite spun
out. For which Reason I shall not
any longer presume upon his Pa-
tience farther than needs I must.

IN the five foregoing *Parts* of
this *Essay* I lay down what I have
to propose relating to the *Condition*
of the *Earth* during the *Time* of
the *Deluge*, and ever since that *Time*.

And

And here I am to make a Stand: to look a great way back: and make some *Reflections* upon the Posture of Things *before the Deluge*.

The Method I take may perhaps be censur'd by some as preposterous, because I thus treat last of the *Antediluvian Earth*, which was first in Order of Nature. But they will, I hope, let fall that Censure, when they are acquainted that 'tis a thing of Constraint, and not of Choice: and that 'twas for want of Footing, and Ground to go upon, that I did not take *that Earth* under Consideration sooner. The Truth is, there was no Way for me to come to any competent Knowledge of it, or to give any sure Judgment concerning it, but meerly by *Induction*: and by Contemplation of the *Shells, Bones, and other Remains* of it, which are still in being. Now, before I could inferr any thing from *these*, it lay upon me to make out that they all belonged to *that Earth*, and were the genuine *Products* of it: to shew likewise how they became bury'd and disposed in the Manner we at this Day find them: and by

what Means they were preserved till now. And *that* is what I have been hitherto about, so that this is indeed but the Place for this Disquisition concerning the *Antediluvian Earth*: and it could not well have been brought in before.

Had there not been *still remaining* a great many *Animal* and *Vegetable Bodies* that were the legitimate Offsprings of *that Earth*, it would have been an extravagant and impracticable Undertaking to have gone about to have determined any thing concerning it: and the more so because the *Earth* it self was *dissolved* and *destroy'd* *. But I prove that

* Part II.
Confess. 2.

there are such *Remains* of it, inclos'd in great Plenty in the Marble, Stone, and the other compacter *Strata* of the *present Earth*, whereby they have been preserv'd, thro' so many Ages, quite down to our Times: and are like to endure, many of them, much longer; even as long as the *Strata* themselves continue in the *Condition* they now are. So that *these* will be a sure and lasting *Monument*, and *Evidence*, to *Posterity*, quite down to the *End* of

of the *World*, of the *Truth* and *Certainty* of that extraordinary Accident, the *Destruction* of the *Earth*, and of *Mankind*, by the *Deluge*.

Now because the *Observations* which I make use of in the former Parts of this Work give an Account of the said *Productions* thus preserved, I proceed upon those *Observations*, as hitherto: and, by *Inferences* which easily, clearly, and naturally flow from them, shew what was the *Condition* and State of *that Earth*, and wherein it differ'd from *this* we now inhabit.

And in regard that, from a *Theory* which, how much soever it may relish of Wit and Invention, hath no real *Foundation* either in *Nature* or *History*, the *Author* so often mention'd already hath set forth an *imaginary* and *fiditious Earth*, whose *Posture* to the *Sun* he supposes to have been much *different* from *that* which the *Earth* at *present* obtains, and *such* that there could be no *Alteration* of Heat and Cold, no Summer and Winter, as now there is, but a constant *Uniformity* of *Weather*, and *Equality* of *Seasons**: an *Earth* with-

* *Theory of the Earth,*
l. 1. c. 6. §
l. 2. c. 3.

out

• out any Sea: without *Mountains*,
 • *ma.* or other *Inequalities**: and without
 1. 1. 2. 3. either *Metalls* or *Minerals* †: in few
 1. 2. 2. 6. Words, one perfectly unlike what
 the *Amoskruian Earth* was in Truth
 and Reality: and perfectly unlike
 that which *Moses* hath represented;
 I shall interpose some *Considerations*
 which would have been otherwise
 needless and superfluous: which
 are directly levell'd against these
Mistakes: and evince that, wherever
 he hath receded from the *Mosaic*
Account of that *Earth*, he hath at
 the same time also receded from
Nature, and Matter of *Fact*; and
 this purely from the aforesaid *Ob-*
servations; from which I shall
 prove,

1. That the *Face* of the *Earth*, be-
 fore the Deluge, was not *smooth*,
even, and *uniform*: but *unequal*,
 and distinguish'd with *Mountains*,
Valleys, and *Plains*: as also with
Sea, *Lakes*, and *Rivers*.
2. That the *Quantity* of *Water* upon
 the Surface of the *Globe* was near-
 ly the *same* as now: the *Ocean* of
 the same *Extent*, and possess'd an
 equal Share of the *Globe*; inter-
 mixing

Part VI. of the Earth.

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mixing with the *Land* so as to choquer it into *Earth* and *Water*, and to make much the same *Diversities* of *Sea* and *Land* as we behold at present.

That the *Water* of the *Sea* was saturated with *Salt*, in like Manner as now it is. That it was agitated with *Tides*, or a *Flux* and *Reflux*: with *Storms* and other *Commutations*. 3-

That the *Sea* was very abundantly replenish'd with *Fish* of all *Sorts*: as well of the cartilaginous and squammose, as of the testaceous and crustaceous *Kinds*: and that the *Lakes* and *Rivers* were as plentifully furnish'd with *Lake* and *River-Fish* of all *Sorts*. 4-

That the *Earth* was very exuberantly beset with *Trees*, *Shrubs*, and *Herbs*: and stock'd with *Animals*, of all *Kinds*, *Quadrupeds*, *Fowls*, and *Insects*: and this on all *Sides*, and in all *Parts* of it, quite round the *Globe*. 5-

That the *Animal* and *Vegetable Productions* of the *Antediluvian Earth* did not in any wise differ from those of the present *Earth*. That there were then the very same *Kinds* of *Animals* 6-

Animals and Vegetables, and the same subordinate *Species* under each *Kind* that *now* there is. That they were of the *same Stature* and *Size*, as well as of the *same Shape*: their *Parts* of the *same Fabrick*, *Texture*, *Constitution*, and *Colour*, as are those of the Animals and Vegetables at *this Day* in being.

7. That there were *Metalls*, and *Minerals*, in the *Antediluvian Earth*.

8. That the *Terraqueous Globe* had the *same Site* and *Position* in respect of the *Sun* that it *now* hath. That its *Axis* was not *parallel* to that of the *Ecliptic*, but *inclined* in like Manner as it is at *present*: and that there were the same *Successions* of *Heat* and *Cold*, *Wet* and *Dry*: the same *Vicissitudes* of *Seasons*, *Spring*, *Summer*, *Autumn*, and *Winter*, that *now* there is.

It hath been already noted, that these *Propositions* are founded on *Observations* made on the Animal and Vegetable *Remains* of the *Antediluvian Earth*. From those *Remains* we may judge what Sort of Earth *that* was: and see that it was not different from *this* we now inhabit.

Now

Now though 'tis not to be expected that I *here* formally lay down those *Observations*, that being not the Business of *this Tract*, yet until I have Opportunity both of doing so, and of shewing in what Manner the foregoing *Propositions* flow from them, it may be very convenient that I give some short *Directions* how the Reader, for his present Satisfaction, may, of himself, and without my Assistance, make out the principal Articles of these *Propositions* from the *Observations* already deliver'd in the several Parts of this Discourse, and from one or two more that I shall add upon this Occasion. And that he may at one View discover how consonant the *Account* which *Moses* hath left us of the Primitive Earth, is to *this* which we have from *Nature*, and how much the late *Theory of the Earth* differs from both, I will set down that Writer's Sense of the Matter under each Head as we pass along.

To begin therefore with the *Sea*: That there was *one* before the Deluge, there needs not, I think, any other Proof than the *Productions* of it

nably conclude, not only that the *Sea* was of the *same Bigness* and *Capacity* before the *Deluge*, but that it was of much the *same Form* also, and interwoven with the *Earth*, in like Manner as at this Time; that there was *Sea* in or near the very *same Places* or Parts of the *Globe*: that *each Sea* had its *peculiar Shell-Fish*, and those of the *same Kinds* that now it hath: that there was the *same Diversity* of *Climates*, here *warmer* and more agreeable to the *Southern Shell-Fish*, there *colder* and better suited to the *Northern* ones: the *same Variation* of *Soils*, this *Tract* affording such a *Terrestrial Matter* as is proper for the *Formation* and *Nourishment* of *one Sort* of *Shell-fish*, *that* of *another*: in few Words, that there was then much the *same Appearance* of *Nature*, and *Face of Things* that we behold in the *present Earth*. But of this more by and by.

That the *Water* of the *Sea* was *salt*, as now it is, may be made out likewise from those *Shells*, and other the *Productions* of it. For they are of the *same Constitution*, and consist of the *same Sort* of *Matter* that do the

the Shells at *this Day* found upon our *Shores* *. And particularly such of them as remain found and unpurified yield, upon Tryal, a true *Marine Salt*; in like Manner as *these* also do. The *Salt*, wherewith the *Sea-Water* is saturated, is part of the *Food* of the *Shell-Fish* residing therein, and a main *Ingredient* in the Make of their *Bodies*; they living upon *this*, and upon the *Mud* and other vegetative *Earthy Matter* there. Now that ~~that~~ *Sea* was *Salt*, there needs not I think a fuller Proof than that the *Shells* which are owing to it thus retain still in them a real *marine Salt*.

And that the *Sea ebb'd and flow'd* before the Deluge, may be inferr'd, not so much from the Necessity of *that Motion*, and the many and great *Uses* of it in the Natural World *, as from certain *Effects* that it had upon the *Shells*, and other like *Bodies* yet preserved. 'Tis known that the *Sea*, by this Access and Recess, shuffling the empty *Shells*, or whatever else lies expos'd upon the *Shores*, and bearing them along with it backwards and forward up-

* *Vid. pag.*
23, 24, &
25, *supra*.

* *Confer*
Pag. 51, &
173.

on the Sand there, *frets* and *wears* them away by little and little, in tract of Time reducing those that are concave and gibbose to a flat, and at length *grinding* them away almost to nothing. And there are, not uncommonly, found *Shells* so worn, enclos'd, amongst others, in *Stone*.

As the Sea-Shells afford us a sure Argument of a Sea, so do the *River-Shells* of *Rivers*, in the *Antediluvian* Earth. And if there were *Rivers*, there must needs also have been *Mountains*; for *they* will not flow unless upon a *Declivity*, and their Sources be rais'd above the Earth's ordinary Surface, so that they may run upon a *Descent**; the
Swift-

* Confer Part 3. Sect. 1. Pag. 170, & 171, *supra*. The *Theorist*, I know, supposes both the Antediluvian and the present Earth to be of an Oval Figure, and protended towards the Poles; as thinking that such a Figure would afford him a Plane so much inclined towards the *Æquator*, that the Rivers might flow upon it though there were no Mountains. But 'tis certain they could not. Nor are there any the least Grounds to believe that the first Earth was of that Figure. If he had had any thing that had look'd like a Proof of it, he had done well to have produced it. But 'tis evident, though we imagine the Earth formed that Way he proposes, it would not have fallen into any such Figure. And for the present Earth, 'tis of a Figure as different from that which he assigns as it well could be; it being a *Spheroides prolatus*, as appears from the late Discoveries concerning it.

Swiftness of their Current, and the Quantity of Water refunded by them, being proportioned generally to the Height of their Sources, and the Bigness of the Mountains, out of which they arise. Mountains being proved, nothing need be said concerning Valleys; they necessarily following from that Proof, as being nothing but the Intervalls betwixt the Mountains. But let us see what Moses hath on this Subject. And ^{* Gen. vii. 19. & seq.} the Waters (he is treating of the Deluge) prevailed exceedingly upon the Earth: and all the HIGH HILLS that were under the whole Heaven were cover'd. Fifteen Cubits upwards did the Waters prevail: and the MOUNTAINS were cover'd. And all Flesh dyed: — all in whose Nostrils was the Breath of Life. The Theorist avers that there were no Mountains in the first Earth: and therefore would have this to be understood of those which were raised afterwards. But that cannot be. For the Historian here plainly makes these Mountains the Standards and Measures of the Rise of the Water; which they could never have been*

had they not been *standing* when it did so *rise* and overpour the *Earth*. His Intention in the whole is to acquaint us that all Land-Creatures whatever, both Men, Quadrupeds, Birds, and Insects, perish'd, and were destroy'd by the Water, *Noah* only excepted, *and they that were with him in the Ark*. And at the same Time, to let us see the *Truth* and *Probability* of the Thing : to convince us that there was no Way for any one to escape, and particularly that none could save themselves by climbing up to the Tops of the *Mountains* that then were, he assures us that *they*, even the highest of them, were all *cover'd* and bury'd under *Water*. Now to say that there were then *no Mountains* : and that *this* is meant of *Mountains* that were not formed till *afterwards*, makes it not intelligible, and indeed hardly common Sense.

The extreme *Fertility* of both Sea and Land before the Deluge, appears sufficiently from the vast and almost incredible *Numbers* of their *Productions* yet extant* ; not to insist upon those which are long ago rotted

* *Vid.*
Part II.

rotted and gone†. Nor need we much wonder at this their *abundant Fruitfulness*, when we know from what Source it proceeded; which our Historian hath opened to us in very significant Words||. And God said, let the Waters bring forth abundantly the moving Creature that hath Life, &c. — And God blessed them, saying, be fruitfull and multiply, and fill the Waters in the Seas: and let Fowl multiply in the Earth, &c. Here was, we see, a Blessing, handed out with the first Pairs of Animals at the Moment of their Creation, very liberal and extensive: and it had Effect with a Witness. A Man that does but behold the *mighty Sholes* of *Shells*, to take *them* for an Instance, that are still remaining, and that lye bedded and cumulated in many Places *Heap upon Heap*, amongst the Ordinary Matter of the Earth, will scarcely be able to believe his Eyes, or conceive which Way *these* could ever live or subsist one by another. But yet subsist they did: and as they themselves testify, well too; an Argument that *that Earth* did not deal out their *Nourishment*

† *Confer*
Pag. 34,
70, 71, 89,
§ Pr. III.
Sect. 2.
Conf. 11.
|| Gen. i. v.
20. § seq.

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with an over-sparing or illiberal Hand.

That these *Productions* of the *Original Earth*, differ not from those of the *Present*, either in *Figure*, in *Magnitude*, in *Texture*, or any other Respect, is easily learn'd by comparing of them. The exact *Agreement* betwixt the *Marine Bodies* I have shewn already*: and shall in due Place shew the same of the *terrestrial ones*.

* p. 23, 24,
25. Conf.
Gen. i. 11,
12, 21, 24,
25. & vi.
30.

As there were such great Numbers of Animals and Vegetables in the *Primitive Earth*, so that there were also *Metalls* and *Minerals*, and these in no less *Plenty* than in *ours*, is very clear from what hath been deliver'd in the *Fourth Part* of this *Essay*, which need not be repeated here. Nor is *Moses* defective in this Point*. And *Zillah*, she also bare *Tubal-Cain*, an *Instructor* of every *Artificer* in *Brass* and *Iron*. The *Theorist*, quite contrary, says, *As for Subterraneous Things, Metalls and Minerals, I believe they had none in the first Earth; and the happier they; no Gold, nor Silver, nor coarser Metalls. Amongst these coarser Me-*
talls

* Gen. iv.
22.

talls are *Copper*, or *Brass*, and *Iron*. Now if there were *none* of these, 'tis a great Mystery to me, I confess, how *Tubal-Cain*, who certainly dy'd either before or at the Deluge*, could ever have taught the Workmanship and Use of them. And yet if this *Theory* be true, there neither was nor could be any within their reach, or that they could ever possibly come at. For the Truth of the *Theory* I am in no wise concerned; the *Composer* of it must look to that; but that there were really both *Metalls* and *Minerals* before the *Deluge*, is most certain. For besides the Testimony that we have of the Thing from *Nature*, and the Passage already alledged out of *Moses*, there is another for which we are also obliged to the same Author, that acquaints us there were both even in *Paradise* it self. 'Tis in his second Chapter*. *The Name of the first River is Pison: that is it which compasseth the whole Land of Havilah, where there is Gold. And the Gold of that Land is good: there is Bdellium and the Onyx-stone.* He speaks here, I grant, only in the Present

* Confer
Gen. vii.

23. 8

1 Pet. iii,

20.

* Gen. ii.

11, 12.

Present Tense, *there is Gold* : but must mean not only that there was Gold and Gems there in *his Time*, but that there was so likewise from the *Beginning* of the *World*, of which he is giving an Account in these two Chapters, or, with Submission, I conceive 'twould not be any thing to his Purpose. He is here speaking of *Paradise* ; which he represents as a most charming and delightful Place, beset with *every Tree that is pleasant to the Sight, and good for Food*† : water'd with refreshing Streams, and excellent Rivers : and abounding with Things, not only useful and convenient, but even the most rare and valuable, the most costly and desirable ; particularly *Gold, Precious Stones, and Perfumes* ; which were all much esteem'd and admir'd by the *Jews*, to whom he wrote this. Nor is it any Paradox, notwithstanding that *Dissolution* of the *Earth* which happen'd at the • Part II. *Deluge*†, to suppose there was this or that *Metall* or *Mineral* in the *same Part* of the *Globe* afterwards where it was before *that* happen'd. The *Water* of the *Abyss* indeed changed
its

its *Place*, during the Time. So did the *Sea*, and bore the *Bodies* it contained, many of them out along with it. But for the *terrestrial Parts* of the Globe, *Metalls*, *Minerals*, *Marble*, *Stone*, and the rest, they, tho' dissolv'd, and assum'd up into the *Water*, did not *flit* or *move* far; but, at the general Subsidence, settled down again in or near the *same Place* from which they were before taken up. For the *Water* was all out upon the Face of the Earth before ever *these* stirr'd, or were fetch'd up out of their native Beds: and they were all sunk down into the same Beds again, before the *Water* began to shift away back to its old Quarters; so that it could not contribute any thing to the Removal of them. Even the very *Vegetables*, and their *Seeds*, which were many of them naturally lighter than the *Water*, assisted by the heavier *terrestrial Matter* that had in this Jumble and Confusion fasten'd and stuck to them, fell all to the Bottom: and the *Water* was in great measure clear, and disengag'd from the *Earthy Mass*, before it went off. And

And 'twas well it was so; for had the *Mineral Matter* of the *Globe* not been held to its *former Station*, but hurried about and *transpos'd* from Place to Place, 'tis scarcely to be conceiv'd how many and great *Inconveniencies* it would have occasion'd. The same likewise for *Vegetables*. Had the *Seeds* of the *Pepper Plant*, the *Nutmeg*, the *Clove*, or the *Cinnamon Trees*, been born from *Java*, *Banda*, the *Moluccoes*, and *Ceylon*, to these *Northern Countries*, they must all have starved for want of *Sun*. Or had the *Seeds* of our *colder Plants* shifted thither, they would have been burnt up and spoil'd by it. But *Things* generally kept to their proper Places: to their old natural *Soil* and *Climate*; which had they not done, all would have been confounded and destroy'd. 'Tis true, the *Vegetables*, being comparatively *lighter* than the ordinary *terrestrial Matter* of the *Globe*, subsided last*: and consequently lying many of them upon the *Surface* of the *Earth*, those which were of considerable *Bulk*, as the bigger Sorts of *Trees*, which had large and spreading

* Confer
Part II.
Consect. 3.

spreading Heads, would lye with their Branches stretch'd up to a great Height in the *Water*, (and, when *that* was withdrawn, in the Air *,) and so, being very much in the *Water's* Way, when it began to depart and retire back again, would be apt to be remov'd and driven forward along with it, especially those which lay in such Places where the Current happened to run strong. Accordingly we now find of *these Trees* in the *Northern Islands*, and the other bleaker and colder Parts of the *Earth*, where none now do, or perhaps ever did, grow *. And there they are of mighty Use to the Inhabitants, affording them a Supply of *Timber* which their own Country doth not yield, and which they employ not only for *Fuel*, which yet is much needed in those cold *Countrys*, but for *Building* likewise, and many other *Purposes*. Whereas in the *Places* whence they were thus driven, they would have been *useless*, yea but an *Incumbrance*, and might be easily spared. For as long as the *Seeds* remained behind, lodged in a natural and agreeable Soil,

* In which Posture 'tis probable the Olive-Tree lay from which the Dove pluck'd off the Leaf that she brought unto Noah, Gen. viii. 11.

* Confer Pag. 127. supra.

Soil, all was safe enough; *they* would soon vegetate, and send forth a *new* Sett of *Trees* there, so that 'twas not much matter what became of the *Old ones*. But to the *Parts* whereunto the *Trees* were thus removed, they are of great *Advantage*. And, which is in Truth very remarkable, and an Argument that there was something more than meer *Chance* in this *Affair*, there are hardly any *Countrys*, especially in the *Northern* and *colder Climes*, that are destitute of *Timber* of their own *Growth*, which have not a very large *Supply* of these *Stray-Trees*, if I may so call them. But to proceed. After that the *Terrestrial Matter* was once sunk down into its several *Beds*, and well settled there, the *Mountains* were cast up, and the *Springs* and *Rivers* burst forth, in such Numbers, and at such Distances from one another, in *all Parts* of the *Globe*, as best answer'd the *Necessities* and *Expences* of *each*: and therefore undoubtedly in much the *same Places* that they were before the *Deluge*. All Things were so contriv'd and order'd in the *Re-
fitting*

ting up the *Globe* at this Time, that they might best execute and perform each their several *Ends* and *Offices*. There were the same *Measures* taken, and the same *Process* us'd in this *Re-Formation* of it, that were us'd when 'twas first built : and much such an *Earth* arose out of the *Deluge*, as at the *Creation*, sprung out of *Nothing**. But the Reader will more clearly discover all this, with the Reasons of it, if he give but himself the Trouble to compare *Part 2. Conf. 2. & seq. Part 3. Sect. 1. pag. 171. & seq. & Sect. 2. Conf. 2, 3, & 7. Part 4. Conf. 3. & Part 6. Conf. 9.* This premis'd, it would be, I think, not strange should we find *Paradise* at this Day where *Adam* left it : the same *Rivers* : the same *Face* of the *Ground* : the same *Metalls* and *Minerals*, that then there were. And I the rather note this, because I see there are some so earnest in Quest of it. Learned Men have been now a long Time searching after the happy Country from which our first Parents were exil'd. If they can find it, with all my Heart : and there have been some that

* *Vid.*
Pag. 109.
supra.

that have sought it with that Industry that I think they deserve it for their Pains whenever they make the Discovery. To deal freely, I am of Opinion there's no Part of the *present Earth* that does come up fully to the *Mosaick* Description of *Paradise*. The Country about *Babylon*, or *Bagdet*, bids fairest for it : and I am perswaded that it was thereabouts. But if so, whoever shall compare this Country, as *now* it stands, with *that* Description, will find that it sustained some *Alterations* from the *Deluge*, perhaps *more* than any Part of the *Earth* besides. And there's an obvious *Reason* why it should. There was a *Paradise before*, but was to be none *after* the *Deluge*. The *Case* was *alter'd*, and the *Reason* of the Thing *ceased*. So that *all* that denominated it *Paradise*, and that *distinguish'd* it from the *rest* of the *Globe*, was *lop'd off* by the *Deluge* : and *that* only left which it enjoy'd in common with its neighbour Countreyes. Upon the whole, 'tis, I think, apparent that what I offer in this Discourse is so far from doing any Diskindness
to

to the Cause these Gentlemen are, and have been so long engag'd in, that it does them a real Service, and helps them out with the main Thing whereat they stuck; fairly solving all *Difficulties* in the *Mosaic* Relation of *Paradise*. Wherefore now to proceed to the last Head to be discuss'd, the *Vicissitude* of *Seasons*, Summer and Winter, Heat and Cold, in the *Antediluvian World*.

And that there really was such a *Vicissitude* we need not go any further for Proof than to the afore-said *Animal* and *Vegetable Bodyes* still preserved; the general Tenour of them speaking it out so plainly as to leave no Room for Doubt.

There are, we know, some Sorts of *Vegetables* which consist of *Particles* very *fine*, *light*, and *active*: and which therefore require only a *smaller Degree* of *Heat* to raise them*, from out the Earth, up into the *Seeds*, *Roots*, or *Bodyes* of those *Vegetables*, for their *Growth* and *Nourishment*. So that for the Raising of *these*, the *Sun's Power*, when only *lesser*, is *sufficient*. And therefore they begin to appear in the

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* *Vid.*
Part III.
Sect. 1.
Consect. 8.
Pag. 139.

earlier Months, in *February*, and *March*; when they first peep forth of the Ground: after a while they display themselves, shewing their whole *Tire of Leaves*: then their *Flowers*: next their *Seeds*: and lastly when, in the following Months, *April*, and *May*, the *Sun* is farther advanc'd, and (to speak in the Phrase of the *Vulgar*, which I choose all along for the Sake of Plainness) hath gain'd a greater Strength, the *Heat* becomes too powerful and boisterous for them; it now mounting up the *Terrestrial Matter* with such *Force* and *Rapidity*, that the *Plants* cannot assume that Part of it which is proper for their Nourishment, as it passes through them, nor incorporate it with them, as before they were wont when it pass'd more gently and leisurely. Nay the *Heat* at length grows so great, that it again *dissipates* and bears off those very *Corpuscles* which before it brought; the *Parts* of these *Plants* being very tender, as consisting of *Corpuscles* which are extremely small and light, and therefore the more easily dissipable. So that then these *Plants* dye away,

away, shrink down again into the Earth, and all, save only their Roots and Seeds, *vanish and disappear*. But when the *Sun's Heat* is thus far *advanc'd*, 'tis but just come up to the Pitch of *another Set* of *Vegetables*: and but great enough to excite and bear up the *Terrestrial Particles*, which are more *crass* and *ponderous*. And therefore those *Plants*, which consist of *such*, begin *then* to shoot forth, and display themselves. So that the Months of *April* and *May* present us with another *Crop* and *Rank* of *Plants*. For the same Reason, also, *June*, *July*, and *August* go *farther*, and exhibit a still *different Shew* of *Vegetables*, and *Face* of Things. But when, in the Months of *September* and *October*, the *Sun's Power* is again *diminish'd*, and its *Heat* but about equivalent to *that* of *March* and *April*, it again suits the *Plants* which were *then* in Season; so that they, many of them, spring up afresh in *these* Months, and flourish over anew, in like Manner as before they did in *those*; till being check'd by the *Cold* of the succeeding *Winter*, the

Sun being gone off, and having now no longer *Power* great enough to bring up and supply them with fresh Matter, they presently begin to *decline* for want thereof, and at length quite dwindle away and *disappear*, untill the Arrival of the *Spring Season*, when they take their *Turns* over again as formerly. Yea the more *tender* and *fugitive Parts*, as the *Leaves* of many of the more *sturdy* and *vigorous Vegetables*, *Shrubs*, and *Trees*, suffer the same Fate, and *fall off* for want of the Supply from beneath; those only which are more *tenacious*, *consistent*, and *hardy*, enduring the *Brunt*, and making a shift to subsist for the Time without such *Recruit* and *Reparation*. 'Tis therefore, we see, most apparent that this *Succession* of *Things* upon the Face of the Earth, is purely the Result and Effect of the *Vicissitude* of *Seasons*: and is as constant and certain as is the *Cause* of that *Vicissitude*, the *Sun's Declination*: so certain, that were a Man kept for some Time *Blindfold*, in such Manner that he could have no Notice how the *Years* pass'd

pass'd on, and was at length turn'd forth into the next Field or Garden, he would not need any other Almanack to inform him what *Season* of the Year it then was.

But if, instead of this *Variation* of *Heat*, we suppose that there was an *Equality* or constant *Temperature* of it before the *Deluge*, which is what the *Theorist* contends for, the Case would be very much alter'd, and *that* altogether for the worse. A Man can hardly at first imagine what a *Train* of ill *Consequences* would follow from such a Condition and Posture of Things; of which 'twould not be the least that such a Mediocrity of Heat would deprive the World of the most beautiful and the most useful Parts of all the whole Creation: and would be so far from exalting the Earth to a more happy and Paradisiacal *State*, which is what he brought it in for, that 'twould turn it to a general *Desolation*, and a meer barren Wilderness, to say no worse. Such an *Heat* would be too little for some *Sorts* of *Vegetables*, and too great for *others*. The more *fine* and *tender*

der Plants, those which will not bear a Degree of *Heat* beyond that of *April*, would be all *burnt up*, and *destroy'd* by it; whilst it could never reach the more *lofty* and *robust*, nor would there be near *Heat* enough to ripen their *Fruits* and bring them to *Perfection*. Nothing would suit and hit *all*, and answer every *End* of *Nature*, but such a gradual *Increase* and *Decrease* of *Heat* as *now* there is. I must not descend to the *Animal* World, where the *Inconveniencies* would be as many and as great as in the *Vegetable*; and such a Situation of the *Sun* and *Earth*, as that which the *Theorist* supposes, is so far from being preferable to *this* which at present obtains, that this hath infinitely the *Advantage* of it in all Respects.

Be that how it will, for I have no need to insist upon it, but may take the Thing in his Way, and suppose that such a *Temperature* would have all the happy Effects that he expects from it; yet there is one very considerable *Phænomenon* of the *Vegetable* Remains of *that Earth*, which affords us a sure and plain Indication

Indication that there was not then any such *Temperature*. From *these* it clearly appears that there was the same *Order* and *Succeſſion* of Things upon the *Face* of the *Earth* that there is at *this Time*. Now this *Succeſſion* being, as we have ſeen, cauſed meerly by the *Variation* of the *Sun's Heat*, it muſt needs follow, that there was then the *ſame Variations* of it, and conſequently the ſame *Alternations* of *Seasons*, that now there is. Had there been an *Equality* of *Heat*, if we grant that it could have produced all the *Plants* in Nature, which 'tis impoſſible it ever ſhould, it muſt have done it *indifferently* and *uncertainly*. There could be no Reason why they ſhould flouriſh at any *one ſet Time* rather than *another*. That is peculiarly the Effect of the *Sun's Variation*. So that they muſt needs have been all in *Confuſion*: and this *Succeſſion* of *Things* would have been quite overturned. The *Plants*, which now appear in the moſt *different* and *diſtant Seasons*, would have been all in *Prime*, and flouriſhing together at the *ſame Time*. So that they would

have had *February* and *May*, *July* and *September*, all in one Scene. Nay, the several *Individuals* of the *same Kind* must have been as greatly at odds: one arrived to *Seed*, and that fully *ripe*, and ready to *shed*; whilst another was not so much as come to *Flower*, but in as differing a *State* and *Hue* as could be. In brief, there would have been all the *Diversity*, *Uncertainty*, and *Disorder*, in the *Vegetable Kingdom* that can well be conceiv'd. Which indeed is no more than what he freely owns; telling us that then *Every Season was a Seed-time to Nature, and every Season an Harvest*. This is what he does, and must grant; and this is as much as is needful for the Overturning *his Hypothesis*. For the *Vegetable Remains* of *that Earth* say no such Thing: they give not any the least Countenance to these *Conjectures*, but the quite contrary: and *these*, being many of them enclos'd in very fine and close Stone, are *preserved* to this Day very curiously, and entire, to Admiration. By *them* we may easily judge how Things *then stood*.
And

And there is so great an Uniformity, and general Consent amongst them, that from it I was enabled to discover what *Time* of the *Year* it was that the *Deluge* began*; the whole *Tenour* of these *Bodies* thus preserv'd clearly pointing forth the Month of *May*†. Nor have I ever met with so much as one single *Plant*, or other *Body*, amongst all those vast *Multitudes* which I have carefully view'd, that is peculiar to any *other Season* of the *Year*: or any thing that falls out earlier, or later :

+ Confer
Part III.
Sect. 2.
Confer. 5.

* Gen. vii. 11. In the second Month, the seventeenth Day of the Month, — were all the Fountains of the great Deep broken up, and the Windows of Heaven were opened. Moses, writing to the Jews, his Country-men, makes use of the Form of the Year then receiving among them, which was indeed the first and most ancient, but had been disused during the Time of their Abode in Egypt, and but newly re-establish'd when this was wrote. [Exod. xii. 2.] In this, *Nisan*, or, as 'twas also call'd, *Adid*, was the first Month: and *Ijar* the second; upon the 17th Day whereof the Waters of the Deluge came forth, according to this Relation. And truly that Time (which is not a little remarkable) falls within the Compass here chalk'd out by Nature so very punctually, that one can scarcely forbear concluding that these Strokes and Lines of Nature, and those of that Relation, came both from the same Hand; but this only by the By. The Particulars of the Computation I here use shall be given at Full elsewhere, they being too many for this Place.

later : any of them short, or any further advanc'd in Growth, Seed, or the like, than they now usually are in *that Month* ; which assuredly could never have happen'd, had there really been such an *Equality of Seasons*, and constant *Temperature of Heat*, as is imagined by the *Theorist*. There are some *Phænomena* of the *Animal Remains* of *that Earth* which afford us more Arguments to the same Purpose, and those not less concluding than the others ; but these I shall wholly wave for the present, there being indeed no Occasion to make use of them here.

I shall now only look a little into the *Mosaic Archives*, to observe what they furnish us with upon this Subject, and I have done ; for I perceive I have, before I am aware, much exceeded the Measures I design'd ; which, on so copious a Subject, 'twas hard not to do. *Gen. i. 14. And God said, let there be LIGHTS in the Firmament of the Heaven, to divide the Day from the Night : and let them be for Signs, and for SEASONS, and for Days, and Years.* This Passage, we see does not at all favour the

Part VI. of the Earth.

303

the Opinion that there was no *Variation of Seasons* before the *Deluge*. So far from it, that should a Man go about with never so set *Study* and *Design* to describe such a *Natural Form* of the *Year* as is that which is at present *establish'd*, he could scarcely ever do it in so few Words again that were so fit and proper, so full and express; especially if, by *Signs*, in this Place, *Months* are intended; for then we have here, first the *Year*: and that subdivided into its usual Parts, the four *Quarters* or *Seasons*, the twelve *Signs* or *Months*, and *Days*. Nay at the same Time, from the 19th Verse, we learn that *this Establishment* is, within four Days, as old as the World. But further, Gen.viii. 21, 22. *And the Lord said in his Heart, I will not again curse the Ground, — neither will I again smite any more every Thing living as I have done. While the Earth remaineth, Seed-Time and Harvest, and Cold and Heat, and Summer and Winter, and Day and Night, shall not cease.* This was pronounc'd upon *Noah's Sacrificing*, at his coming forth of the Ark,

Ark, after the *Deluge* was over : and implies, that there had indeed then lately been a mighty *Confusion* of Things, for the Time : an Interruption and Perturbation of the *ordinary Course* of them : and a Cessation and Suspension of the *Laws* of *Nature* : but withall gives Security and Assurance that there should never be the like any more to the End of the World : that for the future they should all run again in their old Chancel : and that particularly there should be the same *Vicissitudes of Seasons, and Alternations of Heat and Cold*, that were *before the Deluge*.

F I N I S.



BOOKS wrote by the AUTHOR

BRIEF Instructions for making Observations in all Parts of the World : as also for collecting, preserving, and sending over Natural Things. Being an Attempt to settle an universal Correspondence, for the Advancement of usefull Knowledge, both Natural, and Civil, 4^{to}.

Naturalis Historia Telluris illustrata & aucta. Unà cum ejusdem Defensione ; præsertim contra nuperas Objectiones D.El. Camerarii Med. Prof. Tubingensis. Accedit Methodica, & ad ipsam Naturæ Normam instituta, Fossilium in Classes Distributio. 8^{vo}. 1714.

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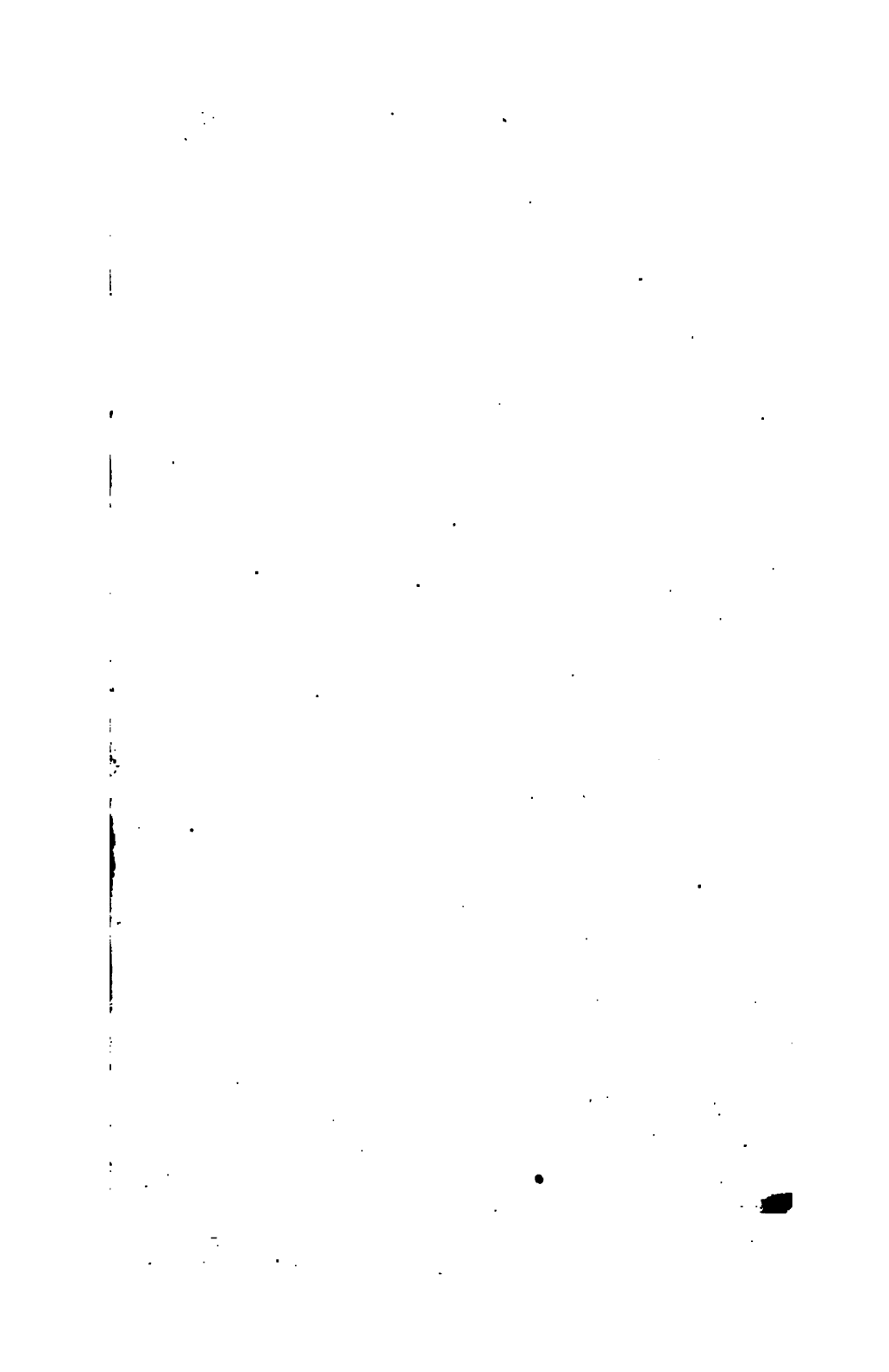
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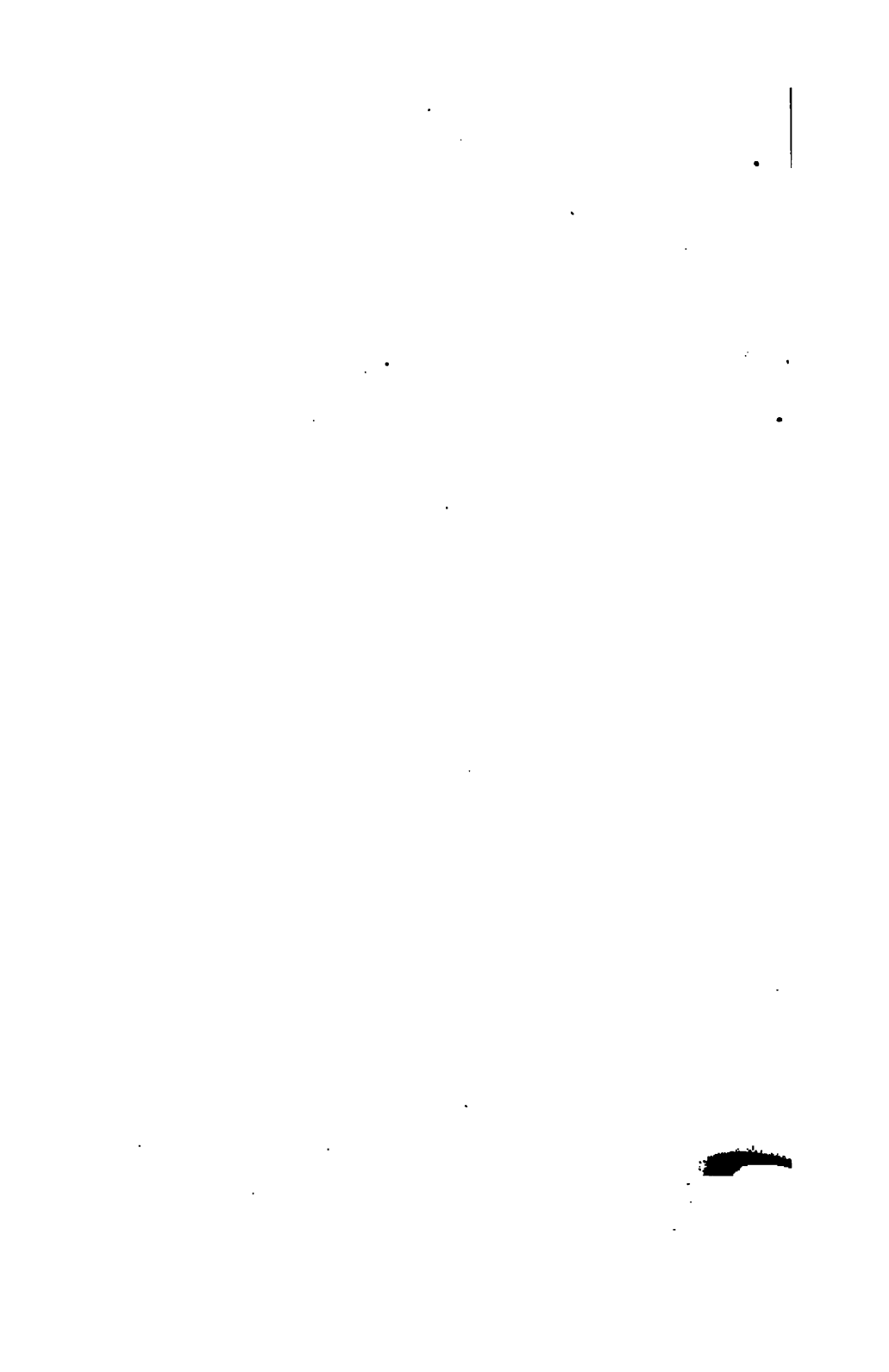
















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